The Builder.

VOL. XVIII.—No. 923.

Hospital Construction.

R. COMBE invites criticism on his plan of a regimental hospital, which we published in a recent number,* and we hope, therefore, any remarks we may make will be taken simply as an attempt to further elucidate sound principles of hospital construction. It is most gratifying to see army surgeons again turning their attention to this question, and it will be well for the army and for the nation if such attention be continuous. The names of Pringle and Lind will be more and more revered as the sound doctrines they enunciated and enforced are practically applied, and the spirit of their teaching is acted upon in the army and naval medical schools. Miss Nightingale has shown, by her evidence before the Army Medical Board, as also by her writings generally, that, in practice, sanitary science has been and is most sadly neglected. The army and naval death-rates are sufficient confirmation. Argument is an idle waste. The figures to be found in published returns are facts beyond dispute. Let any one compare the death-rates for the whole period of the Crimean campaign, contrasting the state of the British army and the British hospitals, month by month, with the state of the French army and French hospitals in parallel months, and he will see that as sanitary works and regulations were put in force in the British army and hospitals, the death and sickness rates were reduced; whilst, in the French army and hospitals, they increased to the termination of the war. It has, in fact, been said that the terrible mortality in the French hospitals (at the rate of 5,000 per month for the last three months of the war), necessitated, on the part of France, a speedy peace. We have a high respect for Dr. Combe, because he has evidently been studying sanitary science; but we are not able to approve fully of his plan for a regimental hospital, for reasons to be given.

In the first place let us say "model plans," like model rules, seldom work in every-day use, if rigidly applied: there may, however, be an alphabet of sanitary science, and a grammar; and the better these (the alphabet and grammar) are learned, the more wisely the science will be applied, and so much the more beneficial will be the results. With respect to hospitals and barracks for the British army, who shall devise a model plan and model rules suited to all climates, sites, and subsoils? British soldiers are expected to do duty amidst the winter snow of Canada, the tropical heat of Central India, and all the intermediate gradations of climate. It must, therefore, be clear that a model plan for hospital or barrack, to be always followed, would be a model nuisance. One law of nature must be attended to—the law of constant change of air within rooms inhabited by men. Fresh air and sunlight must be rendered available, with pure soft water, and fresh food in wholesome variety: clothing, work, and exercise, that is amusement, must also be attended to. Any medical officer must not only act, but must first think and feel for the men under his charge; and, as the result of experience, we will answer for it that such medical officer will receive his reward in the gratifying respect and esteem of the men under his care.

Dr. Combe recognizes the pavilion plan, but does not fully express it in his arrangement. The word "pavilion" implies unity—a tent, a room under one roof; and it ought, in future, to be understood, when applied to hospitals, as meaning a separate building. This is certainly our idea of it, and also the idea Miss Nightingale has embodied in her Liverpool papers. Each ward must be one pavilion, and in its arrangements complete. A building planned so as to present three wards in radii, with a central block and closed angles, is not on the true pavilion plan. The hall, with glass roof, would be found a costly nuisance. Glass radiates heat, and condenses moisture: if the framing is of timber, this decays rapidly; if of iron, there are constant expansion and contraction, and "joint" leakage. Top lights of large area, acting also as a roof, are not often advisable, excepting for covering plants, when dropping water cannot do much injury. The idea of large areas covered by glass, is more poetical than practical. Ask the tenants at the Crystal Palace their experience. The ward dimensions given by Dr. Combe are not what we should recommend,—100 feet by 22 feet by 15 feet, for twenty-eight beds, or 1,178 cubic feet per bed. Such room would be too narrow by at the least 3 feet. Miss Nightingale gives 111 feet 6 inches by 30 feet by 17 feet, for thirty-two beds, or 1,760 cubic feet per bed, with closets, bath, &c., at the end. Dr. Combe cannot give the cubic space indicated by Miss Nightingale, because of a recent army regulation as to hospital accommodation. Dr. Combe has placed closets in the middle of the length of his model ward on one side, and a scullery opposite. The results would be that the scullery so placed would become a mere gossipping place for patients and orderlies. As to the soil-pan closets projected from the side, there is evidence to show that a taint would be driven against and through the windows by every side wind,—modified, no doubt, and reduced in intensity, but still sufficient to carry, with certain states of the atmosphere, an actual and sensible cause of smell into and through the ward. The continuance of a stream of foul gas, at times, is very curious. It has been known to continue perceptible to a human nose, in the open air, for a full quarter of a mile. As to the arrangement of the separate apartments or rooms, thirty, if we mistake not, are shown for ninety-two ward-beds. Now, in military hospitals, as in civil hospitals, separate rooms should be reduced to a minimum. Rooms have holes and corners to harbour dust. They are additional places to clean, and also to skulk in.

The two small wards shown for four beds each, have neither light nor means of ventilation sufficient. Dr. Combe, it is true, gives a qualified approval of such wards, but he counts the eight beds to make up ninety-two. Small wards are specially objectionable for ophthalmic cases. They become nests of disease, and aggravate rather than cure. Further, the administrative offices are scarcely so planned as to facilitate administration. The hospital sergeant is placed at too great a distance from the wards. An hospital sergeant ought to overlook his ward by day and by night. Military hospitals should be places to cure the sick, not to be married in. The sewerage and drainage, as shown on Dr. Combe's plan, would be extravagant: "external and in right lines," certainly, but with the greatest possible lengths to do the least possible good. Sewers and drains should remove subsoil-water from the covered site, surface-water, and roof-water, as also waste and soil-water from within the hospital. Sewers and drains may run parallel to buildings, but external, so as to remove subsoil-water, to the full depth of such sewer, from the area covered by any building.

As to a general hospital, Dr. Combe appears scarcely to have apprehended the idea of a "general hospital," as he seems to consider it necessary to "agglomerate" sick together in order to realize a "general hospital." The pavilion plan of structure, rightly understood, is recommended expressly in order to make "a general hospital" possible without any one of the risks of "agglomeration."

There are general hospitals at this moment with fewer sick under one roof than Dr. Combe proposes to put in his. "Segregation," which he justly insists upon, will, we are told, be effectually carried out in the new military hospital about to be erected at Woolwich; if by segregation he means placing a small number of sick in each building, and isolating each such building, so as to form houses much more separate than houses are in a street within a town. The new hospital at Woolwich is not to be an agglomeration of regimental hospitals, but a general hospital under the new regulations. With regard to the site selected for the new hospital at Woolwich, we are assured that it has not a clay subsoil, but is geologically known as the "Woolwich pebble bed;" a mixture of shingle and loam resting on clay. This site will be sewered and drained; and, to obviate any risk even of subsoil-damp, the floors will be isolated by a basement above the level of the ground. The authorities, it is asserted, have used their utmost exertions to secure the best available site. The hospital question deserves to be fully discussed, and needs to be. Dr. Combe evidently feels this: hence the last paragraph in his paper; and he will not be angry with us for showing him where we differ.

With respect to sites and climates, we may offer a few remarks, the result of a tolerably wide experience, and we are bound to say that sites are more rarely in fault than defective structures, overcrowding, and bad management. A few feet elevation from the ground will mitigate the evils of a damp subsoil. Sidelong ground, that is, a steep hill-side, is about the most difficult site to manage safely, because there is the temptation to level a site by excavating and embanking, and the excavated portion becomes a sort of cellar dwelling, damp, cold, and a reservoir of stagnant air. In all climates, houses half buried in sloping ground are liable to promote excess of disease. Dr. Sutherland noticed this fact in the cholera epidemics in England; Mr. Rawlinson has pointed it out in his sanitary report on Alnwick, 1849; and physicians on the Continent, have independently remarked the same fact. The huts of the 79th regiment, forming part of the garrison of Balaclava in the spring of 1855, present a noticeable example, as may be seen on reference to the Report of the Sanitary Commission in the Crimea. There are, of course, "best sites," such as dry gravel; and, "worst sites," such as a marsh or wet clay. There are also healthy climates, and unhealthy climates; but the wonderful mechanism and power of adaptability in man, which enable him to live in health amidst the frosts of a Polar winter, where mercury becomes a solid, and to breath air having a temperature which roasts dead meat, certainly have the power of adaptation within ordinary ranges of heat and cold from 50 degrees to 90 degrees Fahrenheit. The prime necessity in each case is abundant oxygen, or ever-changing air. In a hot climate there must be an artificial current or change of air created, and in a cold climate there must be artificial warmth; but no room should ever have its temperature raised by animal heat. In a cold climate, animal heat must be preserved by suitable and sufficient food and clothing; in hot climates, heat-producing food should be avoided, and a more rapid change of air should be provided for. With respect to cold the Chinese have a saying, namely, that "only fools and beggars feel cold." The one have not wit to clothe adequately, the other are too poor to provide necessary clothing. Neither our army authorities, nor the general public, sufficiently consider this. Man is a warm-blooded, and, therefore, in a civilized state, clothing animal, and man also requires pure air. The clothing is a matter of adaptation. There is, however, only one reservoir of pure air, and that is beneath the all-encircling canopy of heaven. Fresh air is external, and that will be the best hospital plan which admits it in the most direct manner. Elongated flues, complicated chambers, patent-heating apparatus, and artificial means of change, seldom answer alone. A punkah may be needed in India, but no form of air-fan can be needed in a British winter.

In the army, as in civil life, cost must ever

* See p. 606, *ante*.

be an important element in hospital, in barrack, and in house construction. But this element of cost should be considered in all its bearings. First cost is one element,—working, or administrating cost, is a second element in any calculation,—and the proportionate amount of health or sickness is a third element, and, at present, most unfortunately by far the most important element of cost in hospitals. It could be shown, in figures, that many hospitals have destroyed more money value in human life, in one year, than would have made up the difference betwixt a bad and a good plan, supposing a best plan, in all cases, to be more costly than a bad plan,—a statement we do not allow.

Dr. Combe remarks, justly, that cubical space necessarily bears some relation to other things; especially to the rapidity with which the air is changed. This is true; but only to a limited degree. Any inclosed space, to be inhabited continuously, night and day, as hospitals are, must have large cubic capacity in proportion to the number of inmates. The means of ventilation should be abundant, and the action certain, constant, and requiring the least amount of human care, and there should be a fixed amount of permanent ventilation as little as possible under any servant's or patient's control. Windows with double sashes—both sashes hung—will be best for cold climates, and louvered openings, beneath verandas, for tropical climates. Where double sashes are required for winter-cold, one set may be made removable for summer use; because, in such a climate as Canada, there is an Arctic winter with a tropical heat in summer. Windows with double sashes would probably save their cost in fuel alone, even in the climate of Great Britain; as, judiciously managed, the intermediate air-space would be a means of ventilation and of economizing the heat of the room at the same time, by opening the inner sash at the top and the outer sash at the bottom. Air passing out would give a portion of its heat to the air entering, and the inner glass would retain something of the temperature of the internal air.

In hospitals, each ward should contain such a number of patients as one head-nurse may overlook: Miss Nightingale names thirty-two, Dr. Combe twenty-eight. The width of such a room should not be less than 25 feet: Miss Nightingale prefers 30 feet. The windows should be at regular intervals, on both sides, and opposite: soil-pans, sinks, lavatories, and bath should be at the farther end; the room for superintendent and nurses at the entrance end, with internal windows so arranged as to command a view of the ward night and day. Vitreous substances, such as glazed bricks, tiles, marble, flags, or asphalte, should not be used within the ward, as these absorb and conduct heat rapidly, and, in damp weather, condense moisture. Marble halls sound romantic, and do to dream of, but would make most objectionable hospitals. For the same reasons, metal structures should be avoided. Permanent hospitals, built of brick or stone, should have abundant means for window and door ventilation: temporary hut-hospitals should have abundant means of ridge-ventilation. Any material like patent felt should be used with judgment. Huts must not be made air-tight, like extinguishers, as those at first used in the Crimea were made. The one prime requisite for all hospitals, in every variety and range of climate, is FRESH AIR: to secure this with comfort to the patients and economy of administration is what is wanted. Hospitals may be made places in which the sick may have a chance of recovery rather than an almost certainty of death. Cobbett said of writing, "That is the best writing which the greatest numbers can most easily read." We would say of hospitals, that is the best planned hospital in which the sick can be placed and nursed at the least cost of money and labour with the certainty of the greatest proportion of recoveries throughout the year. The true pavilion system may be one ward or many wards; but each ward must be a complete unit, securing at all seasons means of cheap and efficient nursing; as, also, of sunlight and fresh air.

TRADES' UNIONS AND STRIKES.

In the department of Social Economy, at the recent Glasgow meeting,

Mr. Edmund Potter, President of the Manchester Chamber of Commerce, read a paper on this subject. He said, in the course of it,—

Strikes I consider as the action and the almost inevitable result of commercial bargaining for labour. They will always exist, but their operation will be softened and rationalized by education and sound views. When intimidation or force is used to compel a bargain by either side, it becomes criminal, and ought to be treated as such. Labour ought to be bought and sold, and be considered as a mere purchaseable article, and the honest fulfilment of contracts should be adhered to. Where the unions are the strongest, there the men are the most unthrifty and the population most degraded. Where, also, labour forms a large component part of a trade and there is least mechanical power and capital, the same spectacle is exhibited. Here the speaker gave a recent instance of the working of trades' unions for utterly selfish purposes. It was that of the Coventry workmen and the Blackburn Union. The power of the trades' unions then robs the worker of his right to work, and robs the capitalist of his right to purchase. The union does what in the individual would be dishonesty, and I am not yet willing to think that, by counteracting unions of masters, such things should be prevented. All protection combinations arise from jealousy, fear, or weakness; and how is this caused? The labourer does not save as he might do; hence he is dependent. I would wish him to have power, based upon free thought and self-respect. Strikes would not have much of their misery, were the labourer saving. And yet it is possible that many workmen, such as builders, could be saving, and they should not be obliged to appeal to their fellow-workmen for aid. If it was right to take the step of striking, it should have been prepared for by saving. In 1857 and 1858, thousands in certain districts were working on short time, and yet there was no misery, for the workmen could draw upon the savings' banks. Many of us could look upon the restrictive influence of trades' unions on individual progress, and many men have sacrificed the advancement of a life to the narrow subjection of a trades' union—some from honourable motives, but in most cases from bodily fear and a want of moral courage. Many have consented to abide by a uniform rate of wages, and many might have become masters. In regard to the alleged indifference of the masters as to the cause of strikes, I believe this arises from the conviction that the fact of his being a purchaser of labour ought not to subject his transactions to the special interference of third parties. The condition and education of the present generation of working men should make them, if they choose, as honestly independent of the master-class as does competition between buyers and sellers of other commodities. The success of all private concerns, and more particularly of those larger ones which are constantly looked upon by the unsound philanthropist class as those which ought to be shared in by the workman, is mainly owing to the energetic employment and the working of saved capital, and not to large profits. If the workmen choose to use their small savings, they can now avail themselves of partnerships in almost every trade, under the Limited Liability Act. I do not say this with a promise of success, as I do not think they will be successful in competing with individual energy and capital. Unsoundness must attach itself to every purely trade union, whether it be a burial club, a society for the regulation of wages, or for the enforcement of partnerships. The executive, supported by the mere majority, that majority the least educated, will offer a retarding influence. Further, no trade union ever encouraged invention. Hundreds of inventions are not used because trades' unions are strong enough to prevent them. This is shown in the case of brick-making machines, and thus millions of bad bricks are annually made, and thus society is injured. Unfortunately, the working man continues, in almost every trade—in policy or feeling at least—the unionist. To my mind, one of the most mischievous fallacies of the day is the idea that labourers have the power to form successful and useful combinations, and that masters will voluntarily give in all that had hitherto been tried by force to obtain from them; and that between employers and employed the relations will be those of voluntary partnership. There is a strong distinction between associations for competitive trade purposes, or for national ones, and trades' unions, which are so many unsound monopolies. Associations are voluntary: unions are entered into from class feeling, from fear, and for restriction. No trade union, no protective monopoly, has ever really benefited a people. It may have benefited, temporarily, a small class, but it injures the mass. My opinions do not tend to shelter my class—the masters—by combination against competition. We advise competition. We say, education and industry are the best securities for individual and national progress. The conclusions I come to are;—that trades' unions are founded for an unsound purpose; that consequently their moral effects are bad; that society can be best aided by free and open competition; and that education and forethought alone can secure to every one his fair reward.

Mr. A. K. Hunter, of the Council of United Trades, Glasgow, read a paper on "The objects of Trades' Unions." He wrote to rebut some of the multitude of calumnies which have been uttered, circulated, and believed against them; and said the object of trades' unions was the moral and social improvement of their members. They aim at this elevation by endeavouring to obtain for them as much of the means of living as can be had by fair measures. We may be met by the political economists who hold the doctrine that bare sustenance is all that labour requires, and that to violate this law is against political economy. While it may be true that labour only requires sustenance, it does not follow that the labourer should not receive more than what will keep body and soul together. This would be more than slavery. We know that some men think that all paid-for labour may be looked on as so much withdrawn from the trading power of the nation, and consequently would keep down wages, in order that such persons be not impaired. Such persons are alarmists of the worst kind. Their counsel breeds discontent, and, by indicating strikes, are a curse to the country. Labour may receive and retain command of a greater share of the profits of trade, and the country be nothing the worse, the money still being available for trading purposes: no matter who gets it, if they who get it spend it. National wealth may be owned by all the nation, and the greater the better. Then we would have a people industrious, contented, loyal, and conservative. Working men are determined to be greater sharers in the profits of labour, and make a better use of them than hitherto; in proof of which, we refer to the gigantic schemes of co-operation that are wrought successfully out in our day. A change in our social relations is impending, and we think that the starvation doctrines of those political economists already mentioned have done much to bring about such a change. It is the object of trades' unions to make men independent,—something more than mere hangers-on, wanting, nay begging of their employers to toil. Were trades' unions better supported, we believe it would be for the advantage of ratepayers. The most thoughtful men were unionists, the most careless non-unionists. It was the object of trades' unions to prevent that undue reduction of wages that has so often followed the introduction of machinery. If that was not attended to society would be composed only of millionaires and paupers. While we admit that all the acts of trades' unions are not what we could wish, we venture to predict that in our own day they will be as well conducted as any other popular institution. Mr. Hunter adverted at length to the struggles of the operative bakers of England and Ireland, and concluded by saying that men not in union were generally in the lowest state possible, both as regards wages and position. Carlyle had said with great force and beauty,—"Yet ten men united in love were capable of being and doing what ten thousand singly would fail to accomplish. Infinite is the help man can yield to man." That was the condition on which we take our stand; otherwise there would be what Carlyle calls a "community of drudges."

On the next day a report of a committee appointed by the Council of the Social Science Association was brought up and read. The suggestions and observations with which it concluded are as follows:—

1. That trade societies have of late years increased in number, and that an increased number of working men have become members of them.
2. That societies composed of workmen who are engaged in the same trade in different parts of the country have shown a disposition to unite; that societies connected with different trades in the same town have also shown a disposition to unite.
3. That the principles upon which trade societies regulate their proceedings are more moderate, and that discussions between the workmen belonging to them and their masters have been managed in a fairer spirit than in the times before the repeal of the laws against combination.
4. That the workmen belonging to these societies form

a better estimate now than heretofore of the condition of their respective trades; that they are less unreasonable in their expectations of obtaining increased wages; that they understand better the necessity of submitting to reduction; that they have generally overcome the prejudices which they once entertained against machinery, and that their leaders are men of high character and intelligence.

5. That the strikes, though more frequent, are conducted with less violence than in former days.

6. That these changes are owing in a great measure to the increased publicity which has been given to the rules of the societies, and to the action of public opinion upon them since they have ceased to be illegal.

7. That among the causes of improvement in the general temper of the working men must be reckoned the establishment of joint-stock associations in different parts of England; these associations having contributed both when they have succeeded and when they have failed, to increase their experience, to show them that there are fluctuations in trade over which the masters have no control, and to teach them the necessity of self-control and self-sacrifice.

8. That there are still in many trade societies rules, some acknowledged, some concealed, which interfere with the freedom of the masters and the men, within as well as without the bodies that impose them, and which persons of all schools in political and social economy must utterly condemn.

9. That trade societies have secured the co-operation of many prudent workmen by undertaking to provide maintenance for those who are casually out of employment, or who are seeking for it, by assuming the functions of benefit societies, occasionally by promoting emigration or establishing reading-rooms or libraries.

10. That whilst this union of purposes adds to the attraction of these societies, it not seldom enables a majority of their members to be in an unwilling minority in strikes and all their consequences.

11. That the legal difficulties which rich societies experience in finding a profitable investment for their funds often increase greatly the temptation to employ them in strikes.

12. That leaving out of account the accidental benefits and the accidental mischiefs of trade societies, it must be admitted that they have often assisted the workmen in a trade, more speedily to realise higher wages, when the profits and wages in it have been rising, and that they have, in some instances, been of advantage to the masters, by producing a greater uniformity of wages throughout a trade.

13. That disastrous as have been the immediate results of most strikes, to masters as well as to men, they have not been without their use to both, by inducing wiser and more gracious concessions on one side, and less unreasonable demands on the other.

14. That minor questions connected with trades, which often produce serious visitation, might be advantageously referred to a mixed tribunal of masters and men, but that (in the opinion of a majority of the committee) it would be over sanguine to hope for the removal of the more direct and serious causes of strife from such arrangements.

15. That the rate of wages must be settled between the masters and the men; and that the intervention of third parties, unless specially invited by both, and possessing in a very high degree the confidence of both, can be of little avail.

16. That the Legislature may do much good service to the workmen, by providing an easy and cheap remedy both in law and equity to meet the case of disputes between trades' societies and the members, especially in respect to the application of benefit funds.

17. That the slightest return to the old policy of prohibiting combinations would be most mischievous, and (as a majority of the committee think) that no legislative measures for preventing strikes and lock-outs could be effectual.

18. That combinations of masters and of men have always tended to become tyrannical, when their rules, discussions, and modes of action have been kept secret; and that willingness to expose them to the public is the best pledge they can give that they are not engaged in plots which are dangerous to the public.

19. That the improved education of masters and of men is, there is good reason to hope, doing more to avert collisions between them than any mere arrangement, whether voluntary or enforced; that the experience of the past has convinced many of the employers that not to care for their hands, not to promote their intellectual and moral welfare, not to show to all sympathy and forbearance, is to ruin themselves; and that the employed are learning that without temperance and self-government they must be slavish, that their interests are the same with those of the whole land, that the more they respect their own order the less they will be at war with every other.

The President said they had now heard the report, and he would now call upon Mr. Hughes to move the adoption of the report *pro formâ*.

Mr. ("Tom Brown") Hughes then moved that the report be received. He believed for himself that the action of trades' unions was to stop strikes—not to create them. He believed it was quite easy that there might be tribunals in each trade to regulate wages in a dispute. One of the largest employers in Yorkshire had suggested that at this very meeting of the Social Science Association, a society should be formed to get masters and men to arbitrate.

Sir Archibald Alison, in course of a long speech, said;—No one has any conception of the magnitude of the devastation caused by these strikes. I do not think it is possible to exaggerate the evils arising from strikes. I have been brought into contact officially, as public prosecutor and as sheriff, with five or six great strikes in this county, and I am sure I am within bounds when I say that each of these strikes has cost the labouring classes of Lanarkshire not less than 500,000*l*. That loss was not sustained merely in wages: it was a loss divided by them with the persons with whom they dealt, and who depended upon their labour for their own employment. For every one that strikes there are, at least, six or eight other persons thrown into distress who have never struck—who are advised, perhaps, to strike, but who, nevertheless, are the innocent participators in the sufferings it produces. Now, gentlemen, in contemplating this subject, there are two facts, which appear to me to be of vital importance, with the view of showing how these evils which we deplore may be remedied. The first of these is the great and growing improvement which has taken place of late years in the mode by which strikes are conducted. I think that is owing, not so much to the change made in the law in 1825, when trades' unions were legalized, as to the growing influence of public opinion. I think trades' unions in themselves are not only a proper but a necessary balance in the fabric of society. I think that without them capital would become far too powerful, and workmen would be far too much beaten down. I wish now to point out a mode in which they may avoid the character which their former conduct has caused, and gain their legitimate objects. In the first place, I agree with the report that nothing tends more to conciliate the working classes, and remove hostility between master and tradesmen, than kind intercourse with them. I would recommend, also, that trades' unions should attend to the circumstances under which a strike will be effectual, and the circumstances in which it necessarily must fail. My advice to those trades' unions who have consulted me has always been—"Don't strike except when prices are rising: never strike when prices are falling."

The propositions were discussed by numerous other speakers at considerable length, but no resolution was come to.

THE RESTORATIONS AT WARKWORTH.

A CHARM, both architectural and literary, attaches to Warkworth. Here, the divine Williams,—as the French savant designates Shakspere,—laid the scene of the principal part of his drama of Henry IV. The rock-hewn hermitage that suggested one of Bishop Percy's reliques of ancient poetry, "the hermit of Warkworth," is close at hand; and the fringe of sea-coast is that described by Sir Walter Scott, in "Marmion," when the abbess of Whitby's "cloistered pile" voyages to Lindisfarne,—

> And now the vessel skirts the strand
> Of mountainous Northumberland.
>
> At Coquet-isle their beads they tell,
> To the good saint who own'd the cell;
> Then did the Aine attention claim,
> And Warkworth proud of Percy's name.

All who have recently travelled to Glasgow from the south, using the York and Berwick Railway, must have noticed the castle, prominent with its watch-tower; and other southerners who have not seen Northumberland, may know the castle through Turner's picture of it, in the Water-Colour-room of the Brompton Museum.

On the crest of the hill, up whose gentle acclivity the one wide street is built, stand the remains of the once mighty castle: at the foot is the church. The term, "remains," in connection with the castle, must not be construed to mean a pile of ruins; on the contrary, the shell of the keep is nearly entire: nor is it till we are close upon the structure, that we can perceive any marks of decay in the curtain-wall, which, strengthened with several mural towers, surrounds the baily beneath the south and west fronts of the keep. The picturesque neighbourhood is thus described in the Elizabethan survey made by Clarkson:—"The castle is envyroned on thre partes with the sayd ryver (Coquet); and of the north parte, in an angle within the said water, is situate a towne, called the boroughe of Warkworth, and the parish church, and at the north ende thereof a bridge over the water, and a little towre buyld on th' ende of the sayd bridge, wher a pair of gates ys hanged." Castle, church, and bridge, with the little tower at the end thereof, are still standing; and it is of the good stewardship of those upon whom the charge of them at present devolves, that we are going to tell.

Both church and castle have been restored: the former, thoroughly; the latter, partially. The old chroniclers relate that the church was originally founded by the Saxon monarch, Ceowulph, and that he insured the immortality of his name by founding many churches, and resigning his kingdom, and taking the monastic vows and habit of the monks of Lindisfarne. All honour to their veracity! In the course of the recent restorations, beneath the chancel arch of the existing church, the oldest portion of which are Norman, were uncovered the foundations of a Saxon edifice. They were 4 feet thick, and the lowest corner-stone was found hollowed for deposits, as in modern times. It was with regret we learnt that the Normans had been beforehand, and left the receptacle empty. There are some minds that refuse to credit the statements of the monastic chroniclers; but here, to support their testimony, is an evidence that has been buried nearly eight hundred years; and, as if this were not corroboration enough, a small Saxon cross, carved with a basket-work pattern, was also brought to light. On the decay, or, more probably, demolition of this church, the Normans proceeded to build a nave and chancel over the same site, though not, as we have seen, upon the same foundations. About a century later an Early English tower was added at the west end. There are suggestions of a slight renovation having been effected in the Decorated period, which are most borne out, perhaps, by a niche in the chancel arch. Then, in the Perpendicular period, a thorough rearrangement must have been organized. The south wall of the nave was taken down and replaced by columns, and a south aisle added, which was lighted by the large windows characteristic of the Perpendicular period. The pointed roof of the nave was also condemned to give place to the prevailing mode: so the walls were heightened, clerestory windows inserted, and a flat roof thrown across, leaving a tell-tale mark of the apex of the old roof still visible on the tower. Subsequently a wrought ornamental iron altar-rail was fixed, *tempo* Queen Anne. After this Georgian churchwardens did their best, or worst. They voted it high pen pews, plenty of whitewash, large sash windows in lieu of the Norman lights, and a bran new gallery, supported on iron posts. Then came a long season of complacency and inaction, till at last the pews began to rot and to harbour mice and insects, and the fabric fell a prey to damp. The rain found its way through the roof, and the work of so many centuries was threatened with utter ruin.

To avert this catastrophe the worthy vicar set on foot a proposition to restore the edifice, when he was met with the usual amount of preparatory opposition. On these occasions there are always some people who think decayed churches very nice and interesting as they are; others, who believe that to touch them would end in spoiling them; others, who are more difficult to be convinced than any, that if there is to be an expenditure of money, it would be better to build a new church than to patch up an old one. Strong in the labour of love, the vicar waved all objections, and commenced his task. When once fairly in hand, support and aid came from all quarters; showing, beyond all words, the catching influence of a loveable work if only set about. Gifts of stained glass, and other objects of ornamental art, were freely promised: thus encouraged, the vicar brought the good work to a successful termination—the handsomely renovated church being opened for divine service on the 16th ult.

As the church was originally Norman, the selection of the Norman style, as the basis for the restorations, was considered correct. The care of [the nave was entrusted to Mr. Dobson, of Newcastle; while Mr. Christian, as architect to the Ecclesiastical Commissioners, was responsible for the chancel. The flat perpendicular roof over the nave was taken down, and superseded, in its turn, by an open timber one; the sash-windows were removed, and the Norman lights replaced; the high pen pews dismissed, and open benches substituted; the gallery demolished; and the old plank-panelled pulpit and reading-desk replaced by new. In the removal of so much of the perpendicular masonry as was rendered necessary by the determination to return to the high-pitched roof, numerous fragments of Norman sculpture were found built up in it: corbels of the usual grotesque character, portions of mouldings, and of shafts. This operation laid bare the Norman corbels that had borne the weight of the original roof, consequently the identical starting-point might have been chosen; but, for some reason, these corbels are left standing out from the wall, and the new roof is carried on others at a slightly increased altitude.

The chancel still boasted its Norman stone groined roof, although the Norman east lights had been displaced for one of the churchwarden's neat sashes: so it remained for Mr. Christian to re-open the Norman triplet, and to see to any needful repair of the ancient groining. All this, and more has been done. The triplet is filled with stained glass, from the studio of Messrs. Clayton & Bell, the subjects of which are depictured in medallions, with much religious sentiment and some harmony of colour.

A small memorial window by Wailes, in the north wall of the nave, and another in the circular opening over the chancel arch, have been inserted,

besides a large, six-light, perpendicular window in the west end of the south aisle, representing the whole army of martyrs, elaborately executed by Messrs. Clayton & Bell.

Turning from the church, and climbing the steep street, we see the proud, grey, lichen-tufted castle, with the bold bas-reliefs of the Percy lion sculptured on its towers, grand, impressive, and heart-stirring, like the strains of martial music. We pass through the entrance-tower "with our heads full of the ancient Percys," as Wordsworth said, and find ourselves within the baily. Through the green sward rise the bases of clustered columns, fragments of an intended collegiate church, whose founder did not live to carry out his purpose. Here and there hillocks reveal the burial-place of fallen masonry, and all the towers are roofless, and bestow glimpses of the sky through the frayed and mullioned window openings; but the wide stone steps that lead up to the entrance-door of the keep, are new and white, and neatly squared, and as the eye takes further survey it finds the windows of the south-west tower glazed, with new stonework all round about them, and a new ribbed lead roof also visible. This is the tower lately restored and furnished in Mediæval style by his Grace the Duke of Northumberland. Of a surety we can subscribe to all the royal surveyor said, when he wrote, in 1538, that this was "a marvellous proper donjon."

The plan of the keep is a square, out of the four sides of which advance four additional towers. It contains, besides private apartments, a fine banqueting-hall, which had a dais and music-gallery, a chapel with oratory, a mighty kitchen, with butteries, cellars, huge tanks for water, oven and boiler. The masonry, as we have said elsewhere, is in good preservation; but the timber of the floors and roof, with the lead, have been abstracted; regarding which, a document, still extant, shows that they were presented to one of the auditors of the family, by the Countess of Northumberland, in 1672, as a contribution to a house he was building for himself at Chenton.

The southernmost of the eight towers is that which has been chosen for restoration; it has been roofed in, floored and fitted with oak, hung with stamped Venetian leather, and furnished with ancient carved oak furniture,—making, when the Oriental carpets are unrolled, and the sideboards set out with choice specimens of ancient ceramic art, a very cabinet picture of an interior in "ye olden times."

Descending to the bank of the river, we trace its shining course till we see upon the opposite shore a high sandstone rock, pierced with a doorway and loop-lights. This is the Hermitage. A ferry-boat assists us across the twinkling, salmon-haunted stream. "My tears have been my meat day and night," wrote the hermit over the inner doorway, and every detail of his cell was pervaded with the same intense and passionate expression. It is divided into three chambers, of which the principal is the chapel. Here he seems to have lavished his solitary labour. He wrought the roof into groined compartments, divided by ribs, which terminated in pillars resting on the ground. He ornamented the windows with tracery; he begrudged not the tedious and scrupulous exactness required for mouldings; he hewed out an altar, a piscina, and a lavatory. But more than at any time, when he worked out the sentiment of his soul on the recumbent effigy of his lady-love, "My tears have been my meat day and night" must have been the heart-rending chant to which he attuned the strokes of his chisel, as he lingered tenderly over this part of his task. By a lychnoscopic arrangement he contrived to obtain a view of this monument from his sleeping couch in an outer apartment. He also furnished a smaller chamber with an altar, an aumbry, and a confessional. Traces of a kitchen are not too obliterated to be altogether discredited; while a flight of rude steps, hewn on the outer surface of the rock, conducts us to the patch of ground above it, which the hermit cultivated as a garden. On the road thither we pass his well. The breeze from the river dissolves the old-world charm with which we have been enthralled, and we get sceptical as to the diet of tears—the kitchen, the garden, the well, the river, teeming with salmon, force suggestions of more substantial and less saline fare upon us. This state of mind leaves us open to the conviction that modern antiquaries entertain, viz.—that Bishop Percy's pretty ballad was a mere fiction, and that this interesting excavation was a chantry, hollowed out at the direction of the third Earl Percy, of Alnwick, and that the effigy represents Mary Plantagenet, his departed countess.

It is delightful to know that a feeling akin to the old fervour that dictated the erection of these buildings animates their present possessors, and that while the public are permitted to enjoy the beauties of both castle and hermitage, they are well cared for and maintained.

SUBWAYS FOR GAS AND WATER MAINS: REGENT STREET, &c.

Everybody knows that in London our water and our gas are conveyed to our houses by pipes which pass under the streets. Yet few persons are at all aware of the labyrinth of this pipework that lies under the surface of some of our great thoroughfares, unless they may perchance have peeped down some transverse opening that gas, water, or sewer work had caused to be dug in any leading street, and seen a section of the pipeage laid bare. Take Regent-street as an example: there are nineteen lines of mains, of various calibre, from the 10-inch bore down to about 3-inch, that thread their course through this street, the progressive accumulation from time to time as consumption of gas and water, and competition, have increased. With such a multiplication of pipes alterations or repairs to some or other of them must necessarily be of frequent occurrence; and what with this and the circumstance of altering service connections consequent on the consumer changing the source of his supply from one company to another, or from one kind of gas to another, there is a perpetual breaking up of the street, to the annoyance of all that have to pass, and the serious loss of the parish on which devolves the charge of maintenance of the most costly bit of road. Nor will the operation of the New Gas Districting Act diminish the evil, the only change effected here by this being that one company will light the entire of the west side of the street, whilst the other retains the east. For the last few years the representative vestry of St. James's has committed the keeping of this road to a committee of their own body, consisting of a few active tradesmen. And the vestry,—concurring in opinion that it is not only to the advantage of those of their fellow ratepayers who occupy in the street, and also to the interest and credit of the parish generally; but, taking a more enlarged view of the case, by regarding the street as one of not the least attractive of the metropolitan ornaments, that its roadway should be kept in the most perfect state of ornamental repair,—has ever conceded to the committee great latitude of action, and ample funds for their purpose; yet with all this power the committee has ever found itself frustrated in the endeavour to maintain a good road, in consequence of the constant disturbing of the surface by the openings cut to get at gas or water mains. A little more than two years ago the committee employed Mr. Cary to lay down in the street an entire new road on his improved sub-cushion principle; but sections of the work were scarcely out of the hands of the workmen, ere other workmen commenced the digging of holes to get at gas or water mains, and the committee had the mortification of seeing their new road, which had cost 6,450*l.*, thus destroyed bit by bit. In the space of some twenty months, no less than 359 trenches had in this way been dug in it; and scarce a piece of road, of a dozen years' run, then existed that had escaped the infliction of a trench. In April of the present year the committee called to their assistance another professional gentleman, one of the most experienced and eminently esteemed of the metropolitan roadmakers, and under his direction a vast expenditure on the street has been going on ever since; the intent being, in this instance, to attain an entire new 10-inch surface crust of Macadam of great compactness, by means of the simple process of a series of layers of granite of from an inch and a half to two inches thickness, each succeeding layer being allowed time to thoroughly bind and consolidate before the next spread. Six months having been patiently occupied in the pursuance of this process, at an expenditure of 5,800*l.* (less, however, by the cost of cleansing the street for one year), the surface is just arriving at a state of great perfection; perhaps as fine a bed of Macadam as ever was laid down—thanks, however, in this instance, to the partial cessation of trench-cutting consequent on the pending of the new Gas Bill,—and gives promise that, with fair play, it could be maintained for some years to come at a comparatively small outlay. But now again steps in the abominable gas-work excavating—a wholesale affair this time, that will destroy at one fell swoop all that has been gained by these six months' patient work and outlay. The Chartered Gas Company has just intimated to the vestry that they are about to lay down in the street two new mains of great dimensions, in place of two that had become of insufficient size for their business, which work implies the breaking up of the roadway from end to end by a great trench excavation some five or six feet wide being cut right up the centre of the road.

The companies, it is true, are bound to make good, and do reimburse the parish the expense of so doing; but the amount received for restoration in these cases, though covering the actual expense occasioned, yet no more compensates for the damage inflicted on the road than does the payment of the china-mender's bill of 6d. per rivet by the housemaid who has broken her mistress's Sèvres vase.

On the receipt of this vexatious intimation the vestry, taking under review the constant source of annoyance this breaking up of Regent-street has ever been, and the little probability there seemed that in the continuation of existing arrangements there could ever be any abatement, turned attention to the consideration of the propriety of seeking to bring about the formation of an accessible subway, after the plan of the one now being laid down in the new street near Covent-garden, to receive all the necessary mains, as the only apparent means of permanent relief from the evil; the proposition being that such subway should be made at the joint expense of the parish and the several companies whose mains pass through the street, in contributions proportioned to the amount of saving each would derive on the practical working of the arrangement. These bodies are,—1, the parish; 2, the two gas companies; 3, the Waterworks Company; 4, the Electric Telegraph Company; and lastly, on the ground of its being a public improvement, the metropolitan general rate.

The vestry instructed their Works' Committee to seek a conference with the directors of the Chartered Gas Company, with a view to induce delay in the commencement of the proposed work in Regent-street, in order to allow time for a fair consideration of the sub-way project, as also to induce their co-operation in the furtherance of the scheme. The conference came off on the 13th ult., when the committee put forth their case, urging all the points adverted to in the foregoing. The directors admitted the convenience and economy that would accrue on the use of the sub-way, and promised to report without delay to their Board. The Board has entertained the subject of the proposal, and declined to take action upon it; whereupon the vestry determined to withhold their permission to the company, to break up the street for laying down their new mains, until the practicability of their being laid in a properly constructed sub-way shall have been fairly tested. The company, however, assert their power (Gas Works Clauses Act, 1847) to proceed without parish permission; but, backed by clauses 109-10, of the Metropolitan Local Management Act, 1855, the vestry has resolved on resistance, by going, if need be, for an injunction to restrain their proceedings.

Regent-street presents most favourable circumstances to the successful application of the subway, and will well repay for being done, even if it remained an insulated example of the provision; but it is quite certain, that one general connected sub-way system throughout the great leading central lines of thoroughfare of the metropolis is what must be come to before many years. No constructional difficulties stand in the way of the appliances in Regent-street. The whole course of the carriage-way is uninterrupted by vaults or other underground impediments, and ample space exists above the sewer for the introduction of a tunnel of any requisite dimensions. The time for carrying out the work, too, is now opportune, since but little more breaking up of the street, and little more interruption of traffic, would be occasioned by the construction of a sufficient subway than will be caused by the laying down of these ponderous gas mains. The only apparent difficulty in the matter is about the source of the ten or twelve thousand pounds, the probable cost of the work.

The saving to the gas companies by the use of the subway would be incalculable. Under existing circumstances they incur enormous expense in the maintenance of the conducting pipes. For instance, it is calculated that the two gas companies pay to the vestry of St. James's about 150*l.* per annum for reinstatement on account of Regent-street alone; which, if their own costs of opening, &c., be added, which latter at a moderate estimate may be put down at 250*l.*, gives an annual outlay by them of 400*l.*, all of which would be saved to them by their mains lying in a conveniently accessible subway, an amount which capitalized would alone

produce a principal sum sufficient to complete the necessary constructions. Besides which in their favour there would further be the saving by the avoidance of loss from leakage, through defective joints, &c., which the facility of detection and repair would enable them to effect,—a loss which is said to amount to 22 per cent. of all the gas sent out. Nor would the simplification of their pipeage be a small matter in their working economy, since the necessity of the system of service, or secondary, mains would be dispensed with: a single main, it is apprehended, would suffice for the business of each gas supply, and one also would serve for the water distribution; and thus the nineteen mains now in use in Regent-street might be reduced to less than half a dozen.

A principal object of this communication is a hope to draw public attention to the subject of the subway generally; though, in the foregoing, the reference is to one particular street alone; yet the evil existent in Regent-street prevails in a greater or less degree in all the leading thoroughfares: hence the subject is of more extended interest.

An inspection of the plan of the subway now proceeding in the new street—the Covent-garden approach, as illustrated in the last number of the *Builder*—shows the simplicity and economy of the arrangement so manifestly as to insure its adoption in the laying out of any future newly opened-out thoroughfare; but whether the appendage be adaptable to existing streets so as to eventually become a comprehensive, connected system, embracing all the central trunk lines of communication—the "consummation devoutly to be wished"—seems not so certain. The settlement of that question, however, might be much furthered by the subject getting a little ventilation in the *Builder*. Nor in the consideration of the subject should the one fearful drawback be overlooked, viz., the possibility of the occurrence of explosions.

Some of the able, practical, and scientific correspondents of the *Builder* might render good service in the consideration, by throwing enlightenment on the several points. In conclusion it may be observed that, if the advantage of the subway principle be the reality anticipated, the opportunity ought not to be lost of providing the accommodation in such of the leading streets as are now about to be taken up for the formation of the main drainage low-level sewer. Here at least there would be no constructional difficulties presented; and if executed in connection with that greater work, it would be accomplished at greatly diminished expense, and cause no additional public inconvenience during the process. F. C.

MANUFACTURING ART AND MACHINERY.*

The course of Lectures on Manufacturing Art and Machinery, which I have had the honour to be elected by the Council of this College to deliver to the students in the department of Applied Sciences, may, I think, be prefaced by an introductory lecture, which will give me an opportunity of laying down a general outline of the topics which I propose to discuss, and some idea of the method of discussing them which I propose to pursue; and I think it may afford some little aid to the students in the future pursuit of their studies, if I impart to them a few hints gathered from my own experience in fighting the battle of life; and if I encourage them to press forward, without wavering in the difficult although interesting task which they have set themselves to perform, by bringing under their notice the names of those men who have begun their education at the same fountain-head, and who are now occupying responsible posts, and executing some of those improvements which are attracting the notice of the scientific portion of the community, and which will, undoubtedly, serve as an example and incentive to future enterprise and invention. For the proper comprehension of these principles, they, I am sure, feel themselves indebted to the course of instruction which they received in the class-rooms of this excellent institution; and I venture to hope that I may be successful in leading those now placed under my charge to emulate the meritorious endeavours of those to whom I am about to refer, and to inspire them with appreciation of mechanical and manufacturing art, which is on all sides acknowledged to be so eminently beneficial.

Many of those gentlemen who have now come up here with the object of studying the Applied Sciences, have, I dare say, already made up their minds as to the particular calling or profession which they intend to educate themselves for, and which they afterwards purpose following up. Many others, I dare say, are here studying, and at the same time feeling, as it were, their way to find the particular branch which suits their tastes, and waiting till they find the path which lies the most open for them before they finally determine upon the exact course which they intend to pursue in future. I think that I may be allowed to tell each of these classes of students that they are wise; for those who have already made up their minds as to their intended calling or profession may rest assured that if they are *determined* to adhere to their choice and to persevere in their task, they will overcome all obstacles, and speedily attain to excellence in the profession which they have chosen; while those students who have not yet determined upon the exact course which they intend to pursue after leaving the college, may be confident that if they study well there will be abundant opportunity for them to turn their knowledge to account one way or another either in England or abroad; for they must remember that subjects such as mathematics, applied to physics, together with chemistry, geology, and the development of machinery, are the means of daily adding to our national wealth; that as our wealth increases, so there is every probability that our resources will be developed; and that as our sources are developed, so there will be a continual demand for the services of those men who made it their study to understand scientific principles, in order that they may direct and guide others in the performance of the manual labour which it may be thought necessary to bring to bear upon the object to be attained.

Indeed, the course of study in the Applied Sciences prescribed to be followed, is such that, supposing a student upon entering his name has made up his mind to follow up a particular profession, and supposing that at the termination of the time of his probation here, unforeseen circumstances compel him to give up his original intentions, and necessitate his entering upon another calling, I do not see that he could have followed up any other course of study which would have afforded him such facilities for making a good change as that of the Applied Sciences. Supposing, for instance, that a student had come here with a promise of obtaining a commission in the army by the time of his completing his studies in the military department of the Applied Sciences, and supposing that circumstances subsequently arose which disappointed him in procuring his commission (a disappointment which often occurs), how easy it would be for him, with the knowledge he had obtained of mathematics, natural philosophy, chemistry, geology, art of construction, geometrical drawing, manufacturing art, and machinery, and the variety of knowledge which he here has the opportunity of acquiring,—I say how easy it would be for him, having mastered these subjects, to change his intentions of being a military officer, and to become a civil engineer; or, supposing he had intended to be a civil engineer, how easy it would be for him, if desirable, to become the manager of some important manufacture. I do not think, gentlemen, that another set of subjects for study, like those which form the curriculum of the Applied Sciences, could be framed together which would give the student such an opportunity of deviating, without injury to himself, from the path which he originally proposed to follow, but from which uncontrollable circumstances compel him to depart.

Now the section of the department of the Applied Sciences which it is my province to lecture upon is one which, although it treats of common things—that is, treats of the preparation and the method of manufacture of things which are in daily use with almost all of us,—and explains constructions and contrivances which are continually being brought under our notice, yet it must be remembered that improvements in arts and machinery have wrought greater changes in the condition of mankind than any other power or influence; and it is the knowledge of these arts and of these contrivances which gives to civilized nations the superiority which they possess over the ruder and less enlightened people of other lands. It is scarcely necessary for me to bring under your notice, as an illustration of the great social changes which have taken place, owing to the development of the mineral wealth which we have been enabled to obtain by the scientific and beautiful improvement by Watt in the steam pumping-engine (which remains to this day nearly as he left it); the changes which have arisen through the formation of railways, of which Stephenson is commonly called the father, and with the theoretical principles of which the name of Moseley is so intimately connected and justly celebrated; of the changes which have resulted owing to the diffusion of literature, which has to a great extent been brought about by the improvements of Cowper in the printing-machine; and lastly, the changes consequent on the invention and improvement of the electric telegraph, which appears, I think, to ordinary minds the greatest marvel of them all, perhaps on account of the rapidity with which the researches of Continental philosophers, of Faraday and of Daniels, have been brought into practice by the work of many minds directed to the same end, and in which the intellect of Wheatstone played so important a part. I am sure that every one who is in any way connected with King's College must feel proud that four out of the seven distinguished names which I have just mentioned are those of gentlemen who have been professors here; two out of the four are not with us now, but we cannot recall their memories to our minds without feeling that they have, by their individual talents and by their brilliant discoveries and inventions, advanced us as a nation in our national greatness.

And now, gentlemen, to revert more especially to the professional point upon which I have the honour to address you, and begging your kind patience for a few minutes, I will venture to call your attention to a few facts and premises which may perhaps be of interest to you.

The principle of a given manufacture may be explained to, and is easily understood by, any person of ordinary education; yet it does not follow from such explanation, however perfect it may be, and however thoroughly understood by the person who receives it, that the process can there and then be gone through, and put into practice, for there may be many little minute points, many little difficulties of manipulation to be attended to, which can only be ascertained and carried out by a number of years' continual application and training, beginning, perhaps, from the early infancy of the operative, who will have to devote the greater part of his lifetime to the special handicraft in which he excels.

Labour performed by the hands of man, without any other assistance, would be extremely limited in the usefulness of its application; and in order to carry out any great work, some means must be found for uniting the exertion of several men, or else of increasing the power of one man: the combinations and contrivances which effect this unity of exertion or increase of power are called machines.

The labour of cultivating the ground or tilling the earth, which is the earliest form of work with which we are acquainted, requires in its primitive form but little skill and no machinery. Regularity and uniformity in the work are not necessary in turning over the surface of the soil; the rudest and simplest forms of tools may be used; the seed may be scattered by the hand without any external guide or practice; it may be covered with earth in the same manner as it is sown, and requires no further assistance from the labourer. Nature now lends her aid: the highest degree of skill is brought to bear upon the seed: it germinates, sends forth its roots, its stems, its leaves, and grows into a thriving plant, which absorbs its nourishment from the earth, the air, and the light, always keeping in truthful balance the atmosphere in which it lives, performing functions by day and by night which are continually aiding in supporting the life of the man who sowed the seed from which it sprang. The plant flowers and bears fruit, it yields seed a hundred-fold, and in due time man returns and with his unskilled labour gathers in the produce and prepares it for his sustenance. We cannot help comparing the small amount of skill which is required of the man to perform his part of the work with that unbounded wisdom and intelligence which are displayed in the changes which are wrought in the seed after it is once in the ground. We cannot but admire the providence exhibited in the admirable contrivances, the delicate functions, the adaptation of every part for the service which it has to perform. The eye is gratified by the beauty of the colour of the leaves and of the flowers, and with their variety and graceful outline of form, and the reasoning mind wonders at the economy of material and its perfect distribution: with this evidence before us of our utter incapacity, we cannot help admitting the existence of an all-powerful hand immeasurably surpassing us, whose works we can at best but attempt to imitate; and the more we study the supereminent accomplishments of Nature, the more we feel impressed with the short-comings of our ability in

* Introductory Lecture to a course on Manufacturing Art and Machinery, delivered at King's College, London, on the 4th of October, before the principal, professors, students, and visitors, by Professor C. Percy Bysshe Shelley, C.E.

approaching that degree of perfection which is one of its own attributes.

There is not to my mind any labour to which man at his origin could have been appointed which would have given him such a wide field for his intellect, such an unlimited boundary to his inventive faculties, which has formed such a firm basis for the science and theory of the present age, and leads us to put confidence in that Higher Power by which all things are created for our good and pleasure, than that of tilling the ground.

[Here Professor Shelley referred to several leading and recent inventions which owed their origin to students of King's College, and, mentioning the names of several who had distinguished themselves by their scientific acquirements, proceeded to say,—]

In the former part of my lecture I alluded to the importance of theoretical knowledge: but this alone is not sufficient for those who intend to put the Applied Sciences into practice. To the theoretical knowledge taught in the class-rooms must be added the practical knowledge which is only to be obtained in the laboratory and workshops.

In the laboratory the hand will be trained to manipulate with delicacy; the eye will be taught to distinguish, with facility, the various changes of colour and the effects of reactions upon the substances under examination, and that all important difference between dirt and cleanliness, in experimenting, will be better impressed upon the student by one failure through want of attention to it, than by a whole course of lectures on this particular subject.

Chemical cleanliness can, I think, be only learnt in the laboratory; and, in like manner, that which is technically called "truth," and the difficulty of approaching it, can only be learnt in the mechanical workshop. * * * * * *

I have casually referred to some of those former students in this department who have distinguished themselves by the important works they have carried into effect in after-life, and I might add to these many more who derived their education from the same source, and who are deserving not only of the highest praise, but of great public commendation, for the assistance they have lent towards the progress of science, and the appliances they have brought to bear upon the requirements of the age. This, however, time will not allow me to do, but I trust I have said enough to encourage the just emulation of those whom in future I shall have the pleasure to meet in the class-room, and to convince them that the difficulties which must necessarily be experienced in this, as in all scientific occupations, may be easily overcome by the exercise of that patience, perseverance, and application which I feel sure I shall meet with amongst those I see around me.

WAGES AND BUILDING NOTES IN THE TIME OF HENRY III.

Among the records deposited in the Public Record Office, one has been lately discovered by Mr. Burtt, entitled "A Roll of Payments of Wages, and of Purchases for the Works at Westminster, 37 Henry III." Professor Willis, considering it a perfect specimen of this class of documents, gives the following account of its contents in the *Gentleman's Magazine*.

It contains the entire accounts of the building works during thirty-two continuous weeks, beginning with the first week after Easter, which, in that year, 1253, fell on April 20; consequently the works in question began on Monday, April 28, and the last week of the roll ended with Saturday, December 6. The account for each week is complete in itself, but no day of the month is mentioned, neither are the weeks numbered continuously, although for convenience I shall designate them as if they had been.

The first six weeks are indicated as first, second, &c., after Easter (Ebd' prima post Pasch' .....). The seventh week was Whitsun week, and was evidently kept as a holiday, but is not mentioned in the roll: the week next following, the sixth after Easter, being termed the first after Pentecost, is thus actually the eighth week from the beginning of the account roll. This enumeration continues to the fifteenth week, which is termed the eighth after Pentecost. The sixteenth week begins a new series, termed the first, second, &c., "after the agreement for wages for eight weeks" (Ebd' prima post pacacione* stipendior' pro' viii^{to} Ebd'.). This enumeration continues through twelve weeks, and carries us to the end of the twenty-seventh week of the roll. The twenty-eighth is termed the first week after the feast of All Saints, and the succeeding the second, third, &c., concluding with the "Ebdomada v^{ta}," or thirty-second week of the whole, which closes the account.

At the head of each week one or more saints' days are sometimes mentioned in a peculiar manner. Thus, to begin,—the complete title of the first week is—

"Ebd' prima post Pasch' continente festum Apostol. Philip' et Jacobi p' die' Jovis quod est d'ni Regis et festu' Inventionis S^{ce} Crucis p' die Sab' quod est cem'tar'."

"First week after Easter, containing the feast of the Apostles Philip and James on Thursday, which belongs to the King, and the feast of the Invention of the Cross on Saturday, which belongs to the masons." The second week is similarly said to "contain the feast of St. John ante portam Latinam on Tuesday, which belongs to the King;" and the third week is "sine festo." Thus, throughout, the roll feasts occur, sometimes two in a week, but generally only one. Fourteen of the weeks have none. Whatever feasts are mentioned, however, are assigned alternately to the king and to the masons. The only intermission of this rule is in the twenty-seventh week, where the feast of SS. Simon and Jude ought to have been given to the masons, but is assigned to the king, apparently because of the fact, stated in the title of the week, that it is the first day of his regnal year.*

It may be presumed, therefore, that the feast-days thus assigned to the masons were kept as a holiday, and that they worked on the feasts assigned to the king, who in this roll is the employer of the masons.

I am not aware that this curious custom has been noticed by any previous writer. I have set down in the note below the list of the saints' days selected.† It is probable that in other years some other principal saints would have been also included which happen in this year to fall on a Sunday.

Having now discussed the titles to show the mode of designating the weeks, we may examine the accounts themselves. They are placed, for every week, under two heads, the wages and the purchases, or *emptiones*. The sum of each of these is separately stated, as well as the total. The nature of these payments will be best understood by giving a translation of one week complete; for, generally speaking, the workmen, the materials, and other items recur nearly in the same order in every week. There is a great advantage in this; for as the same terms are repeated, it happens that in some cases they are written more at length than in others, or spelled in a more intelligible manner, and thus the collation of so many examples of the same word greatly assists the interpretation of the unusual or technical expressions.

"Second week after Easter, containing on Tuesday the feast of St. John ante portam Latinam, which belongs to the King‡:—

To wages of 39 cutters of white stone, 15 marblers, 26 stonelayers, 32 carpenters with John and his partner at St. Albans, two painters with an assistant, 13 polishers, 19 smiths, 14 glaziers with four plumbers, 15^{li} 10^{s} 1^{d}. [This will give an average of 1s. 10d. per week.]

To wages of 176 inferior workmen with overseers and clerks, and two two-horse carts daily, 9^{l} 17^{s} 2^{d}. [About 9d. a week.]

Sum of wages, 25^{l} 7^{s} 3^{d},

Emptions.—To Master Albericus for arrears of *formpieces* . . . . 66^{s}; 53 feet of *parpents*, 4^{d} per foot; 59 feet of *voussoirs with fillets* at 3^{d} per foot; 1221½ feet at 3^{d} per foot; . . . . 50 *assises* at 5^{d} each assise; 42 *chamberands*; 22 feet of *maignans*; 243 feet *cerches*; 9 feet of *bosses*; and seven *steps*, cut by taskwork, 7^{l} 13^{s} 1^{d}.

Item, for 9 *capitals*, 68 feet of *cscus*, 1,591 feet of *cerches*, 54^{s} 4^{d}.

Item, for 25 hundred and a-half quartern of chalk for the vaults, 8^{s} 7^{d}.

Item, for 22 hundred and 3 quarterns of freestone, 6l. 16s. 6d. To Roger of Reygate for 8 hundred and a quartern of freestone, 53s. 7½d. To Richard the limeburner for 3 hundred of lime, 18s. To Agnes for two hundred and a half of lime, 12s. 6d. To Richard of Eastcheap for 2 dozen hurdles or crates* with poles, 9s. 7d. To Richard Oggel for 5 dozen hurdles with poles, 12s. 6d. To Henry of the bridge for iron nails and whetstones,† 19s. 8d. To Benedict for carriage, porterage, and weighing of 23 cartloads of lead, 9s. 4d. To Richard for *litter*,‡ 18d.

Sum total of emptions, 27l. 12s. 10½d.

Sum total of the week, 53l. and 1½d."

This week may be taken as a fair specimen of the whole. The first part informs us of the number of workmen of each kind that were employed in daily labour: the second part gives the materials and their carriage. The number of white stone cutters was gradually increased from 39 in the first three weeks to 78 in the fifteenth week, and diminished again to 35 in the last weeks. The marblers, about 16 in the first eight weeks, were suddenly increased to 49 in the ninth week, who remained at work till the eighteenth week, and then were suddenly reduced to 31, and went on diminishing to 7. The stonelayers vary from 35 to 4. The 32 carpenters working in the first seven weeks are then reduced gradually to 9 only. The polishers are about 15, and the smiths 18 throughout; but about 14 glaziers employed in the first ten weeks are suddenly reduced to 6 for a month, and then to 2 for the remainder of the time. The inferior workmen vary from 220 to 37. The gross amounts are: stipends, 696l. 8s. 7d.; emptions, 891l. 9s. 5½d.; giving a total of 1,587l. 18s. 0½d.

From these particulars the nature of the work may be surmised; but, unfortunately, there are very few exact indications of the actual buildings upon which the workmen were employed. The only evidences of this kind that I have detected are the following, numbered to correspond with the weeks in which they occur: (1), tables or planks for the chambers of the king and queen; (7), panels for the king's bed, and for a table in the scaccarium; (3), 100 tiles provided for the king's chapel; (15), taskwork at the entrance of the chapter-house (It., p' tasch' int^{o}it^{a} capituli l. s.). From the nineteenth to the twenty-sixth and thirty-first weeks, charges occur in nearly every week for nails for the church and belfry; and in the twenty-fifth week Roger the plumber is paid 10l. and 5l. 13s. 4d. for taskwork at the belfry (*berefridam*). This was probably the detached belfry of the Abbey church, which is known to have stood on the north side, upon the site of the existing Sessions-house.

Stukeley gave drawings of it in the *Archæologia*, vol. i. p. 39, under the name of the *Sanctuary*, but states that it was still called the *Belfry*. Stow relates that Edward III., about 1347, built to the use of St. Stephen's chapel, in the little sanctuary a "chlochard" of stone and timber covered with lead, &c. Widmore (History of Westminster Abbey, p. 11) found it mentioned for the first time in a charter of Edward I. (1290): "It was then called the bellfrey and continued to be used as such, or at least to go by that name till the present towers of the church were built by Abbot Islip." The roll we are now examining shows that it was in course of construction and apparently covered with lead in 37 Hen. III. The building represented by Stukeley is of stone and in two stories, of a form well adapted to serve as the substructure of a lofty timber-framed tower, similar to that of Salisbury, destroyed by Wyatt, but preserved to us in the drawings of Price. The wooden tower had disappeared long before the time of Stow, and the stone substructure was pulled down, in 1750, to

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* Pacatio . . . . pactum, conventio.—*Ducange.*

* This is the title of the twenty-seventh week:—"Ebd' xij^{a} contin' festu' Apostolor, Sim' et Jude quod est dni' Regis anno Regni Regis Henr' xxxviij^{o} incipiente et festu' o'ium S'cor' p'die Sab' quod est cem't. . . ."

† List of the feast-days assigned alternately to the King and the masons, and marked R and C accordingly:—"Philip and James, R; Inven. S. Crucis, C; John ad port. Lat., R; Ascension, C; John Bapt., R; Thom. Mart., C; Magdalen, R; James, C; Pet. ad vinc., R; Assumpt., C; Decollatio, R; Nativ. B. M., C; Michael, R; Trans. b. Edw., C; Luke, R; Sim. and Jude, R; Omn. S'co'm, C; Martin, R; Edmund, C; Katerina, R; Nicholas, C."

‡ "Ebd' ij^{a} post Pasch' contin' festū bi' Joh'is an' porta Latinā p' diē martis quod est d'ni Regis in stipend' xxxix. albor' ciss' xv. marm' xxvi. cubitor' xxxij. carpent' cū I. et socio suo ap'd Scm Alban' Duobz Pictor' cū s'viente xiij. poll' xix. fab^{or}. xiiij. vit^{ar}' cū iij^{or} plubator', xv^{li} x^{s} d'. In stipend' clxxvi. op'ar' cū custodibz clericis cū ij. big' diurnis, ix^{li} xvij^{s} ij^{d}.

Sm^{a} stipend', xxv^{li} vij^{s} ij^{d}.

Emptiones. Mag^{ro} Alb^{ri}co p' arreagiis formar' et . . . . lxvj^{s}, p' liij. ped' de p'pen' p' ped' iiij^{d}, lix. ped' de folsur' cū fil' p' ped' iij^{d}, m^{l} cc. et xxj. ped' et d'i p' ped' iij^{d} . . l. assisis p' assise v^{d}, xlij. chamberand', xxij. ped' maignanz, ccxliij. ped' cerches, ix ped' de bosseus, et vij. passibz cissis ad tasch', vij^{li} xiij^{s} j^{d}. It' p' ix. capitell', lxviij. ped' de escus, m. v^{c} iiij^{xx} xj. ped' de cerch', liij^{s} et iiij^{d}. It' p' mm. v^{c} d'm q^{a}rt' pendent' crete, viij^{s} vij^{d}. It' p' mm. cc. et iij. q^{a}r france petre, vj^{li} xvj^{s} vj^{d}. Rogero de Reygate p' vlij^{c} q^{a}rt franc' petre, liij^{s} vij^{d} ob'. Ricard' Calfon' p' cec. calc', xv^{s}. Agnes p' cc. d'm calc'. xij^{s} vj^{d}. It' Ricard' de Estchep p' ij. duoden' craticl'ar' cū virgis, ix^{s} vij^{d}. Ricard' Oggel p' v. duoden' craticl'ar' cū virg', xij^{s} vj^{d}. Henr' de Ponte p' clavis ferri et gressilis xix^{s} vilj^{d}. Bened'co p' vect'a, portag', et pesg, xxiij. charr plumb', ix^{s} iiij^{d}. Richo' p' litia, xvilj^{d}.

Sm^{a} total' emp'conu', xxvij^{li} xij^{s} x^{d} ob'.

Sm^{a} total' Ebd', liij^{li} et d' ob'."

* In the Westminster Rolls (printed by Smith, Antiq. of Westminster, p. 182, and Brayley and Britton, Hist. of Houses of Parliament, pp. 151, 153), "Hurdles for the scaffolds of St. Stephen's Chapel" occur 4 Ed. III., &c., with beams, and poles, and "leather thongs to tie the said beams and hurdles together." The original Latin is not generally given in these publications, but in one case Smith (or rather Hawkins), p. 184, has "twenty-four hurdles *pro viis super dictam scaffottam*," which explains the use of the hurdles to serve in lieu of the planks we now employ.

† "Henr' de Ponte p' clavis ferri et *gressiis*," xix^{s}. But in the previous week we have "Henr' de Ponte p' *grese* ad Martella acuenda." Ducange gives "oressius Silex. gall. *gres*," (i.e., sandstone or grit). The *grese* for sharpening the *picks* or *stone-hammers* is therefore, not the English word *grease*, as it might appear, but a *whetstone*.

‡ "Literia, stramentum."—*Ducange.*

make way for a new market-house. It had been for a long while occupied as a cellar for the Quakers' Tavern in Thieving-lane. The market-house was in turn pulled down about 1770, and the present Guildhall built as nearly as possible upon the site of the old belfry.

In the second week Magister Albericus is paid for task-work of the *form-pieces* ("pro tascha formarum"), that is, for *window tracery*, probably of the Abbey church, and also 6*l.* 0s. 10d. in the twenty-fifth. On the back of the roll it is recorded that on Tuesday of the fourth week after Pentecost,* on the morrow of the blessed Thomas the Martyr, Master Albericus with three associates began the task-work of three windows. Also that on the Monday after "ad vincula S^{i} Petri" (that is to say, in the fifteenth week of the roll), two parcels of coloured glass, valued at 12s. 2d. a parcel, and two of white glass at 6s. each parcel, were delivered to Master Henry, to be employed in the task-work of the windows, charging per foot wrought of coloured glass 8d., and of white glass 4d.

Another memorandum records that on Monday, the morrow of St. Bartholomew (August 25), the work in the king's quarry began.

Attached to the roll in the sixth week is a letter from Robert de Bremele to Master John de Oxonia,† informing him that he has despatched a boat-load of marble by William Justice, to whom five marcs and a-half and 10s. are to be paid for freight. He also promises to send another boat-load before Pentecost, and a third if he can find a vessel to convey it. Similar letters are attached to the second week and to the twenty-second.

The *emptions* in each week's account include, in the first place, pieces of freestone cut by task-work into various shapes required for doors, windows, arches, vaults, or other portions of the structure, and made ready for setting. These are sometimes separately enumerated by name, as in the second week above, and furnish very curious illustrations of Mediæval nomenclature. But in the latter part of the roll such pieces are all entered in the general form, "In diversis modis france petre ad tascham cisse," "to various shapes of free-stone cut by task-work," and similarly for marble. Next occur stones from the quarries, probably in a rough state, or at least only fit for plain walling. These are "Came stone" (Caen stone); "Reygate stone," generally from Roger de Reygate, and sometimes described as free-stone, "franca petra," e.g. (8), "Rog^{o} de Reygate p' v^{e} and di f^{n}nce pet^{e}, xxxv*s.* ix*d.*;" Grey stone, "petra grisea," (6), "pro. ii. navatis grise pet," and chalk for the *pendentia*,—"creta ad pendentia," the latter being the term universally employed in Mediæval documents for the vaults that rest upon the ribs. In (24) we have "p' marmore apud Cerne xviij^{li} xix^{s}." Beside these, other materials for building occur, as (1), "mmcccc. ferri tenacis de glovernia, iiii^{li} xiij^{s}," iron from Gloucestershire, and as in the specimen week inserted above. In some of these entries we obtain names of trades which are of unusual occurrence. Thus (6), (21), and (12), "Ade *Merenemio* pro bordis et lateis," i.e. Merenemius, a timber-merchant from Meremium. Ricardus *Calfonarius*, the lime-burner (from Calcifurnium or the French Chaufournier) occurs throughout. In (4), (13), (25), Ricardus *Cuparius*,‡ or *Cuvarius*, the cooper, from *Cupa* and *Cuva;* in (1), Jacob *Junctor*, the joiner, for tables; and in (7), "Jacobo *Junur* p' panell' ad lectu d^{ni} Regis jungendis," &c.

The masons' terms for shaped stones are for the most part the same that I have discussed in my "Architectural Nomenclature,"§ in the fifth edition of the "Oxford Glossary," 1850, and elsewhere, but they furnish a variety of spellings which are often instructive. I subjoin a list of those which appear to require explanation. They are arranged in alphabetical order, and the numbers in brackets prefixed to each word indicate the weeks of the roll in which it occurs:—

(1, 3, &c. &c., &c.) *Aseelers*, or ashlar stones.

(3) (2). "1. *assisis* p' assise v.d."...(5). xxi. *Essicis*,—stones prepared for coursed masonry, from the French *assise*.

(2) (3) (5). "ix. ped de *bosseus*...xxxiiij. ped de *boseus*,"—the carved stones placed at the intersection of the ribs of vaults, which are still called *bosses* (*vide* "Arch. Nom.," p. 43, and "Glossary"). They were sometimes termed keys, or *claves*, of which the present roll has an example in (6), "ii. Clavibus et viij. Capitrel."

(4). "... xli. *buscell'* p' *buscell* iij^{d}." (7). "p' xi. '*busch*', xix^{s}. Will. Jacobo p' cc and q^{a}rt^{o}n '*busch*' v^{s}. vij^{d}. ob.' (16). "... q^{a}rtn *busch*', ix^{d}." The first entry is in a list of stones shaped by task-work, and I know no other instance of this use of the word.

But in another list of stones (3) we find "xvi. ped et di et di' q^{a}rt^{r}n. de *grossis rotundis*," which seem, for want of a technical name, to be simply called *great round stones;* and in (2) "xxij. ped *maignanz*," which appear to be merely large stones (*magnums*), from the old French *maigne*. It may be supposed in the same way that the "bushel stones" above were round stones, suitable for a column, which were so distinguished for the moment because they happened to be about the size and shape of a bushel measure (about 18 inches across and 8 inches thick).

The other two examples of the word *bushel* are at the end of the emptions, amongst hurdles, "bokettes," &c., and are probably bushel baskets, or bushel measures of some article not mentioned.

(3). "xi. ped de *Chapem't bowe*" occurs but once, with nothing to indicate its meaning.

(2). "xlij. *chamberand'*." (3). "cxvj. *cham'and'*," also (4) (5). I have found this word repeatedly in the accounts of King's Hall, Cambridge. Thus in 6 Edward IV. in the form *chamberh'nt*, and in 6 Henry VI. as "xix. ped de *chamerants pro magna porta;*" and soon after, "xxiij. ped de *jambes*." In 4 Henry V., "lapid' vocat *champys*," and in 5 Henry V. "*jambys*." I have also found it in other account rolls, and in my "Nomenclature," art. 81, have given another form apparently of the same word, namely, *chaumeres*, which I supposed to be *jawmers*, or stones for the *jambs* of doors or windows. The spelling of the above examples appears to show that this word is the same as the French *chambranle*, the ornamental border or set of mouldings about a door, window, or chimney, and in these early examples was used for the molded stones of the jambs, if not also for the archmolds, or at least for the hoodmolds.

(2). "ccxliij. ped. *cerches*." (9). "cclxviij. ped. de *serches*." *Cherche* and *serche* are old French words for circular arcs, and are used by workmen for convex or curved pieces. In this place they may mean couvex stones such as would be employed in building cylindrical piers.

(2). "lxviij. ped de *escus*." (3) also (9). "iiij^{xx} et x. et di ped' de *scutis*." (5) "xvij. ped de escum't. These are *skew-stones*, *i.e.* stones cut with a bevel edge. Similar terms occur frequently in masons' accounts. (Vide *Skew*, *Skew-table*, &c., in "Arch. Nom." and "Glossary.")

(2) (3) (9). "Folsuris cum filo." (4). "*Rotundis*, folsuris *cum fillet*," *i.e.* voussoirs with a filleted molding.

(4) (5) (3). "Rotundis folsuris," *i.e.* voussoirs with round moldings.

(9). "iii^{xx}.v. folsuræ chanferete," *i.e.* chamfered voussoirs. *Chanfrain* means also channelled or furrowed, and therefore we may include voussoirs with moldings under this expression. All these are voussoirs for molded arches or ribs, and as they occur in company with "chalk for the vaults and bosses" (*creta ad pendentia*), are intended for their ribs.

(5). *Forimells*. (3). *Formellis*. The same as "form-pieces," namely, the stones cut for tracery, ("Arch. Nom.," p. 48, and "Glossary.")

(6). *Lothenges*, stones cut into the form of the heraldic *lozenge*, perhaps for paving.

(6). "It' Rog^{o}. de T^{r}ri pro iiij. *orbilons* xxxiij. sol." This word only occurs in this example, and here in small number. We may guess the thing to be a carved boss or bracket of a globular form; or, as *orbile* is the rim of a wheel, they may be stones in a ring form for tracery.

(2) (3). . . . *perpens*, *parpens*, or through stones.—(Vide *Perpent-stone* in "Glossary.")

(4). *Scention*,' or *scenhon*.' This is a word which frequently occurs, with varied spelling, in Masonic documents. (*Vide* "Scutcheon," in "Arch. Nom.," p. 37, and "Glossary.") It is always used for stones with an obtuse external angle.

(3). "c. et iiij^{xx} ped. de *tablements*,"—string-courses. (Arch. Nom.," p. 25, and "Glossary," art. Table.)

ROB. WILLIS.

* *I.e.* the eleventh week of the Roll.

† John of Oxford occurs in the Westminster Rolls published by Smith, p. 184; 5 Edw. III.

‡ This is given by Ducange.

§ *Vide* "Publications of the Cambridge Antiquarian Society," vol. i., 1844.

INDURATION OF THE EXTERIOR OF THE NEW MUSEUM, TRINITY COLLEGE, DUBLIN.—We learn from the *Dublin Builder* that Messrs. P. S. Barff & Co. have now completed the induration of the Portland stone work of the Museum, Trinity College, with Ransome's patent solutions. We mention it that the result may be noted.

THE CRIMEAN MEMORIAL NEAR WESTMINSTER ABBEY.

THE Mediæval column of granite, about to be erected in the Broad Sanctuary by "Old Westminsters," in memory of those, brought up in the school, who fell in the Crimean war, is at last rising above the hoarding. An engraving of it will be found in our volume for 1858 (p. 694). The group of St. George and the Dragon, which will surmount the column, erroneously attributed in the daily papers, is being executed by Mr. J. R. Clayton. The exigencies of the position (the necessity of obtaining a columnar outline) have enforced a peculiar treatment of the group; but it promises to be an interesting production. It is about 10 feet 6 inches in height. Mr. Scott is the architect; and the work, generally, we believe, is in the hands of Mr. Philip.

HOSPITAL NURSING.

THE various opening addresses have been delivered at the great Metropolitan Schools of Medicine. These addresses were all more or less marked by desire to elevate the position of the rising generation of medical men, and administer to the sufferings of humanity. In some of them it was said that earnest endeavours are now being made, and not before it is time, to provide proper nurses for the sick. Mr. R. D. Grainger, at St. Thomas's Hospital, remarked that he had great satisfaction in stating, that, owing to the wise munificence of one whose name would find an echo in every English heart, and who belonged to that noble, self-sacrificing band already illustrious by a Marguerite d'Angoulême, a Lady Rachel Russell, a Louisa of Prussia,—Florence Nightingale,—one of the greatest wants in the management of the sufferers from accident and disease, skilful and tender nursing, promised to be supplied. There were, at that time, in the wards of St. Thomas's Hospital, fifteen nurses, supported entirely by the "Nightingale" foundation, who had been selected with great care, and who, after proving themselves qualified by examination, would be sent to public institutions to minister to the sick. Already persons of a superior rank, prompted by Christian charity, offered their services; and there was reason to hope that an entire revolution in the system of hospital nursing,—indeed, of the whole class,—would be the result, at no distant period, of this philanthropic measure.

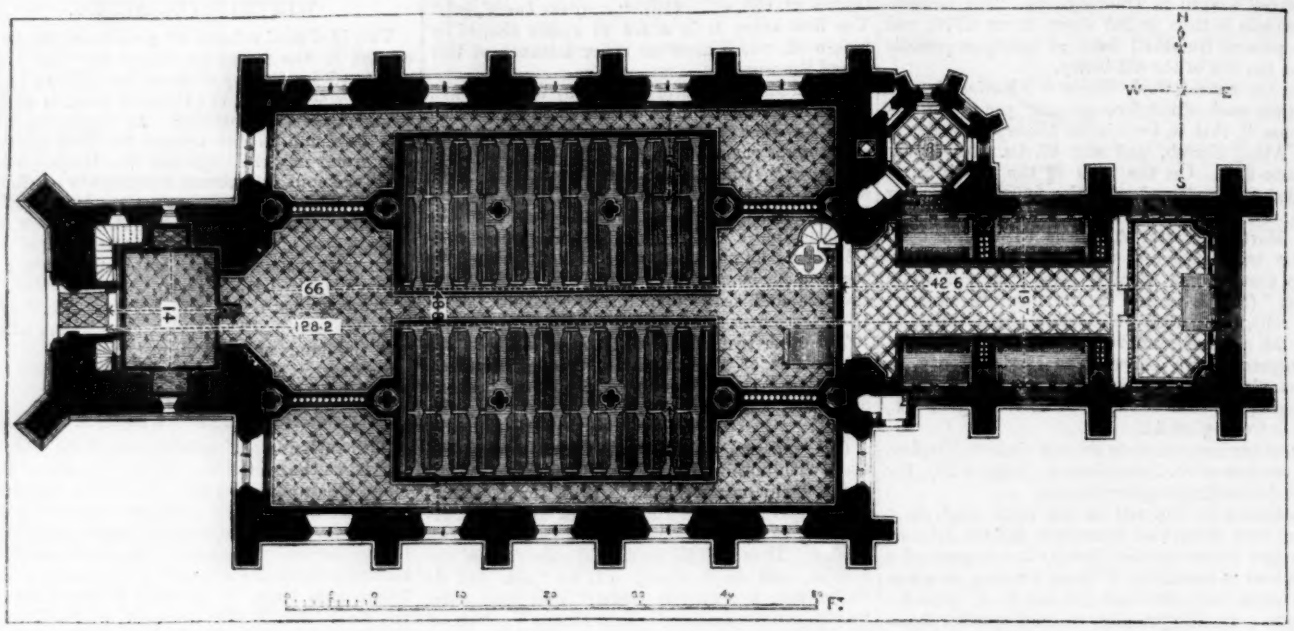
At King's College it was mentioned that Dr. Todd and the late Bishop of London were the originators of St. John's House Training Institution for Nurses. This institution supplied the hospital with a very efficient staff of nurses and lady sisters; and the hospital in its turn afforded to St. John's House the means of training its nurses, many of whom were annually sent out to private patients in all parts of the country. This movement is in operation both in town and in the provinces, and must, before long, lead to beneficial results.

BODELWYDDAN CHURCH.

ST. MARGARET'S, Bodelwyddan, near St. Asaph, of which we give some illustrations, is, internally, if not externally, one of the most elaborate of recently-built Gothic churches. It was consecrated on the 23rd of August, having been commenced on the 24th July, 1856. The church has been erected at the expense of the Dowager Lady Margaret Willoughby de Broke, in memory of her husband, the late Lord Henry Peyto Willoughby de Broke. It stands near to the north front of Bodelwyddan Hall, the residence of Sir Hugh Williams, Bart., and Lady Willoughby's native place, in one of the most picturesque parts of the Vale of Clwyd. Here a parsonage-house, schools, and cottages, also have been erected. Our view shows the exterior of the church; and we also give the general plan, and plans of the tower and spire.

The church, it will be seen, has the usual form on the ground, with addition of an octagonal vestry north of the chancel. The chief dimensions are figured on the plan, which also shows the arrangement of the fittings and heating apparatus, and gives some idea of the decoration of the chancel, and of the flooring of the whole church. The small cut shows the tower and base of the spire in plan, at four stages. The material of the main portion of the fabric is the Bodelwyddan stone, or hard limestone, similar to that of Anglesea, rough or dressed, according to position; whilst the plain-facing to the interior of the nave

BODELWYDDAN CHURCH: GROUND PLAN.



is from the Talacre quarries of Cheshire, a cream-coloured stone. There is no plastering. The nave piers have the clustered shafts of Belgian red marble, the blocks 6 feet 4 inches in length, and 2 feet 4 inches in diameter, on bases of the native stone. The capitals, richly carved with the passion-flower and oak and ivy leaves, are in the native stone, except the abacus, which is of the Belgian red marble. Above the piers, in the spandrils, are shafts of Belgian red marble on corbels. Each corbel of these is foliated, and otherwise enriched, and exhibits a coronet and one of the letters of the name of Lord Willoughby de Broke. The intermediate shafts are carried also by enriched corbels, these forming the apex of each label of a nave-arch. The several shafts carry springers of the open timber roof. There is, however, a band which might be called clerestory, of small trefoiled openings, not showing in the exterior, to light up the nave roof; and the same object is furthered by the lucarnes at a higher level, which appear in our view. The nave and aisles are covered over in separate spans, with arched principals and collars (hammer-beams also in the nave), with cusped spandril spaces, the whole in oak. The external covering is of slate, cut in patterns. The internal height in the nave, from the floor-line to the top of the wall-plate, is 28 feet 9 inches; and thence to the apex of the roof, internally, is 16 feet 6 inches. There is a gallery in the tower. It is carried at the front by two arches, springing in the centre from shafts coupled transversely, and has an open-work front or parapet.

In the chancel there is a more ornamental character in the whole of the details. Ogee crocketed canopies, rising from shafts and corbels, and projecting to form niches, run along the three sides, more elaborately enriched where the reredos occurs. Alabaster, varied in tint, is used for backs of the niches at the sides, Languedoc marble for shafts, and picked white alabaster for the capitals and corbels, the bases being Purbeck marble. The arcades or niches at the sides have the canopies of Caen stone, whilst alabaster is used for those at the reredos. Much carving is introduced, as in crockets and the ball-flower, that at the reredos being in alabaster, and that at the sides in Caen stone. This carving has been executed by Mr. Harmer, under the architect's direction, Mr. Field having contracted for the general marble-work and carving. Beyond the extra richness given to the reredos in the points already named, it has a diaper at the back, and foliated instead of plain capitals. The centre panel has the monogram IHS, with wheat and the vine, and the diaper carved with the passion-flower. The lily is much used in the canopies. The roof principals in the chancel are carried by clustered wall-shafts. These last are of griotte red marble, with a thin fillet of Irish black marble in each hollow to separate the red lines of the shafts. Irish black marble also is used in the necking and the abaci of the capitals, and in the bands of the shafts. The facing of the chancel is of the Bodelwyddan stone in lieu of the Talacre, only enriched, as described, with the shafts and other features in the decorative

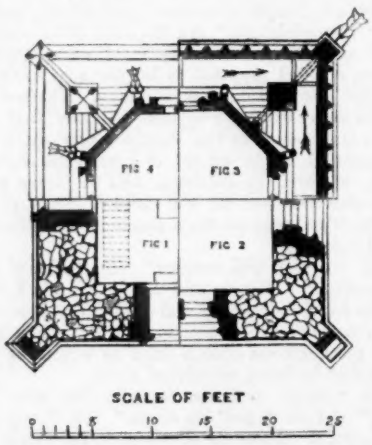


Fig. 1. Quarter Plan of Clock-chamber.
" 2. " Bell-chamber.
" 3. " Base of Spire.
" 4. " Spire above Flying-buttresses.

marbles. The chancel arch is carried on red marble shafts, which rise from corbels. The latter, carved from the native stone, represent angels holding books: with the carving of the nave, they were executed by Mr. Henry Smith. The chancel ceiling is formed into square panels by moulded ribs, with rosettes and bosses at the intersections, and springs from an enriched cornice of which the lower mouldings are carried down to the capitals to form a square head or label, with spandrils over the wall arches above the windows. Each arched principal rib is formed with a cusped trellis work filling-in of what may be called the web, and with mouldings and the ball-flower on the inner edge, corresponding with the projection of the capital from which it springs. The chancel is seated stall-wise, and the nave has open seats, in each case with appropriate panelling and ends. The roofs and seats in the nave were executed by Mr. Grey, of Leamington. The general carved woodwork,—including the pulpit presented by the Misses Williams, sisters of Lady Willoughby, (which has kneeling figures), the reading-desk, the stalls, and the bosses to the chancel ceiling,—was by Mr. Earp. We should add that the commandments are lettered in gold, on panels of dove marble, in the proper places.

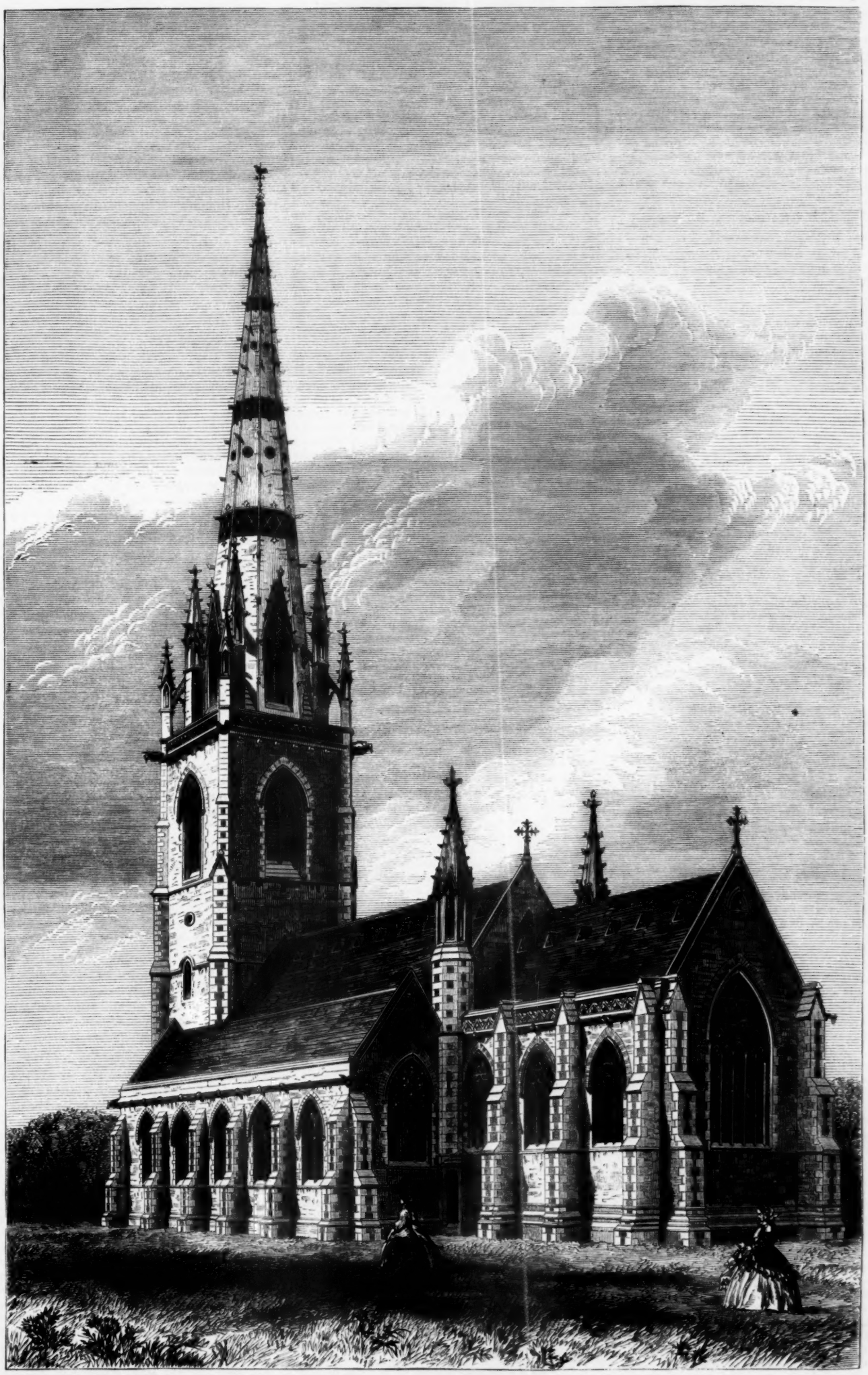
The east window,—one of five lights, with geometrical tracery,—is filled with glass by O'Connor, who executed the glass for the windows next to it. These last mentioned are memorial windows with subjects. There is a circular window at the east end of the north aisle, over the entrance to the vestry; and the western window is also circular, and is filled with geometrical tracery, and surmounted externally by a high crocketed canopy or label moulding, with panelled tracery and coat of arms in the tympanum. The glass for both these windows was presented by the Misses Williams. There is stained glass also in the north and south windows of the tower or entrance, representing—one, Kentigen, the first bishop of St. Asaph; and the other, St. Margaret. In the east window of the south aisle are the arms of St. Asaph and other bearings. The vestry is covered with a leaded roof concealed behind its parapet; and it is lighted by cusped spherical-triangular windows in the upper part of the walls.

The pavement of the church was supplied by Mr. Field. In the nave and aisles there are borders of Irish black and rouge-royal marble polished, bands of rouge-royal and dots of Irish black marble polished, and squares of Portland stone rubbed. In the chancel, communion, and vestry floors the same arrangement is adopted, but the squares are Sicilian marble. In the tower and its recesses the bordering is of Irish black marble polished; the bands are of slate, the squares of Portland stone, and the dots of red tile; whilst in the tower-entrance, Portland stone, and Irish black polished dots, are used. The steps of the communion, chancel, vestry, and private entrance to the chancel, are of polished Sicilian marble. The western doorway, which is skilfully planned to get extra effect from depth beyond that from thickness of the wall, has shafts of polished Aberdeen granite. The screen of the tower archway has the shafts of polished Anglesea marble.

The tower measures 24 feet square on the outside, exclusive of buttresses: the height to the base of spire is 82 feet 6 inches; and the whole height from the ground is about 202 feet. The view and small plans together will show much of what has been aimed at through details. The actual effect of the pierced work of the spire and of the shafts of pinnacles, and of the peculiar crockets, is, we believe, good. Some attention has been given to modifications from the original perpendicular or other right lines of the buttresses and spire, in a manner analogous to the optical corrections in the Greek temples. The buttresses are all built with a batter on the face: the pinnacles of the tower and lucarne lights of the spire incline towards the centre, the *horizontal* lines being kept horizontal; and the spire has an entasis of about 6 inches on each side, or an addition of 1 foot to the total breadth in the middle.

The structural part of the design seems to have been carefully attended to: the masonry throughout is well jointed and put together, especially where the open work occurs in the spire in a thickness of material diminishing from 9 to 6 inches. The gutters of the roofs are protected from an accumulation of snow, by an arrangement of short lengths of battens, fixed transversely to longitudinal pieces, and laid, on blocks, like a ladder, along the gutter. The spaces between the battens will be not more than $\frac{3}{4}$ of an inch wide after the shrinkage; so that snow will not pass through, and there is a clear depth for water to flow in the gutter beneath.

Many contractors have been engaged on the mason's work of the building: some of the number have been already named. Mr. John Thomas (not the sculptor) constructed the carcass of the building, or greater portion of it; and Messrs. Holme & Nicol, of Liverpool, built the spire. Mr. John Gibson, of Westminster, was the architect.



BODELWYDDAN CHURCH, NEAR ST. ASAPH——Mr. John Gibson, Architect.

ILLUSTRATIONS OF FRANCE IN THE BODLEIAN LIBRARY.

Some months ago the archæological section of Historical Works (Paris) ordered several of its members to study a question which for some long time past has occupied the attention of the scientific world, viz., the importance and origin of a collection of drawings known under the name of the "*Collection de Gaignières*," now in the Bodleian Library at Oxford. The report, presented by M. Dauban, in the name of the commission, to the Minister of Public Instruction, &c., has signalled the great value of this collection, and has shown what interest the Imperial Library ought to take in completing, by a reproduction of the Oxford drawings, the rich collection which it already possesses from the same source.

The collections of M. de Gaignières, tutor of the sons of the Grand Dauphin, were presented in 1711 by the *savant* to Louis XIV. They consisted of a considerable number of books, manuscripts, prints, drawings, &c., containing most precious information as to the history and ancient customs of France, and were placed in the King's Library, now the Bibliothèque Impériale. This establishment has preserved the greater portion, and their being so frequently consulted proves their utility to the scientific world. A number, however, of drawings, consisting of twenty-five portfolios full of designs of monuments, especially tombs, escaped from the French possession during the period 1785 to 1801, according to various documents. In comparing the list of drawings at Oxford with the detailed catalogue of the Gaignières collection, drawn up in 1815 by Clairambault, there is every reason to believe that the sixteen folio volumes, bequeathed in 1809 by Richard Plough to the Bodleian Library, belong to this collection. A commission has been appointed to consult upon the best means of reproducing the above, and M. Jules Frappaz, an experienced artist, has been charged by the Minister with the mission of executing, first experimentally and then definitively, the drawings of the Oxford collection, containing about 3,000 subjects. M. Frappaz speaks in the handsomest terms of his reception by the conservators of the Bodleian Library.

THE LATE MR. EBENEZER LANDELLS, ENGRAVER ON WOOD.

We hear with regret of the death of this clever artist, who has in his time done good work. Mr. Landells was a native of Newcastle-on-Tyne, where he was born in 1808, and was descended from a family reared on the banks of the Tweed, but who removed to Newcastle, and carried forward a successful business as drapers. He received an excellent education at Mr. Bruce's academy in Newcastle,—the same good school wherein Robert Stephenson, the engineer, laid the foundation of his knowledge. When about fourteen years of age Landells was apprenticed to Mr. Isaac Nicholson, a wood-engraver, who, however, like the Bewicks, executed general work—engraving on brass, copper, and silver. At that time Thomas Bewick and his brother were showing the capabilities of engraving on wood; but generally the work done was still of a very coarse description. During the days of Mr. Landells's apprenticeship schools of art were not thought of; but in Mr. Nicholson's establishment the boys had an opportunity of learning to sketch and draw: they had also the means of gaining a more general knowledge of art than is obtained by many wood-engravers at present. Having finished his apprenticeship, Mr. Landells came to London, where he found plenty of demand for his work: he was, however, induced to undertake the management of the artistic department in the establishment of an eminent printer and publisher; and this office he held for a considerable period. By this means Mr. Landells was thrown amongst many artistic and literary celebrities, and eventually he was enabled to commence business on his own account, and give employment to a number of engravers and draughtsmen. From that time Mr. Landells has been eminently connected with the illustrated periodical literature of the metropolis. Many of our readers will remember the commencement, in 1841, of the now venerable but still healthy and vigorous *Punch*. Mr. Landells was one of the original three who started the publication. At that time the market was polluted with several journals, which pretended to wit, but had an injurious tendency. It was thought, and wisely, that the wit and satirist, assisted by the draughtsman and engraver, might play a useful part without indulging in calumny or profanity. *Punch* was accordingly launched, Mr. Landells being the chief proprietor, and supplying the engravings. Mr. Mayhew, and, if we remember rightly, Mr. Mark Leman, the first and present editor, were the other two originators. A late member for Pontefract assisted Landells with cash, and was to undertake the printing in order to repay himself. The sight of a journal, in a coffee-house, printed by Bradbury & Evans, led him to call upon them for a tender, and resulted in a very short time in their purchasing the copyright of what has been to them a fortune, and to the public a boon.

After this Mr. Landells, together with the late Mr. Douglas Jerrold, projected "The Illuminated Magazine," which, under the editorship of Jerrold, was continued for two years. Some of the drawings by Kenney Meadows, engraved by Landells, have much merit. After the decline of this, Mr. Landells, advised, we believe, by Mr. Henry Mayhew, started the *Lady's Newspaper*, which, for many years, was under the management of Landells. The *Expositor*, a weekly journal illustrative of the Great Exhibition of 1851, and other works, which have had a varied amount of success, were also planned by him. About the time that he originated *Punch* he was employed upon the *Illustrated News*, and was deputed to follow the Queen in her visit to Scotland, referred to in our notice of the late Mr. Ingram, in our last, and to sketch and engrave the incidents of the journey. This was the first attempt of the kind, and Mr. Landells executed it so successfully that he was afterwards deputed to follow Her Majesty in various other progresses for the same purpose.

More lately Mr. Landells, assisted, by one of his daughters (Alice), produced several artistic works for children (the boys' and girls' toy-makers). These ingenious contrivances enable the young to prepare models of houses, locomotives, and other objects, and so to create things for their amusement, instead of, in the common fashion, destroying the toys which are put into their hands ready made. The last years of Mr. Landells's life have been clouded by difficulties, in a measure resulting from a want of that adherence to matters well planned and commenced, and of those business habits, which, when united with talent, lead to fortune. Many will long remember Mr. Landells for his genial and friendly disposition, and join in the regret experienced by his family at his loss.

THE RECORD OF MATTERS AFFECTING OUR PURSUIT.

Among the papers read at the Social Science Congress at Glasgow, was one of some interest to the order of architects. It was by

Mr. Arthur Symonds, recommending the systematic formation of libraries adapted to every calling, from the Sovereign or Minister of State to each class of man of business. He traces to the want of systematic method in recording matters as they arise, many drawbacks to our social progress, and to the development of the knowledge appropriate to each class of public and private service. To obviate this evil he proposes that, instead of the haphazard formation of libraries, they should be prepared for by an apt, logical, practical arrangement of receptacles, after the manner of books, which would afford a proper place for whatever arises. In exemplification, he produced plans of the arrangement of a state register, and other subsidiary registers, exhibited in due order in cases capable of receiving papers of the folio size, the contents of which are indicated on the backs of the cases. The plan showed various methods of distinguishing by signs and by colours the classes of the books, as well as of relieving the monotony which a long range of books of the same sort would occasion.

Though thus embodied in convenient form, the plan is not formal, but logical. It is framed so as to comprehend every class of matter in due subordination to the general plan, which comprehends the entire field of public service, each portion of which is susceptible of being worked out into the minutest detail, according to the peculiar position and exigencies of the person by whom the plan is used; while, if all Associations would each according to the scope of their own purposes adopt it, the community at large would find in its possession, somewhere, the whole range of science and art provided for.

The author stated that he had originally been led to adopt the plan for official and legislative purposes; but in doing so had discovered its applicability to all other purposes; and that, in the measure of its general adoption, would be the facility of applying it in any instance.

He had read, at the three former meetings of the Association, papers declaratory of the principles and general methods; and it was now his purpose to give, according to a promise, some illustration of the details.

The subject was recommended to the Council of the Association for investigation, as to its applicability to the purpose of reducing, into some scientific shape, the multitudinous topics and communications which it has under consideration.

Every one of us must feel, and every public office and associated body must know, how advantageous it would be if every suggestion, memoir, or record that had been brought forward, bearing on their special objects, were so put away that it could be at any time referred to without trouble.

ARTICLED PUPILS AND THEIR MASTERS.

A correspondent writes as follows:—

"Sir,—May I ask you a question? First, is it legal, and, secondly, is it gentlemanly, in a case where an architect is engaged in public competition, for his articled pupils, without his knowledge, to send their private designs to the same competition? A short notice in your next number would greatly oblige a reader, and one who values your journal and his profession. Architect."

Although we do not know the terms of the "articles," we say at once it is neither legal nor gentlemanly, and we do not envy either master or pupils between whom such a feeling exists as should permit the occurrence. There ought to be between artist-master and pupils deference, confidence, anxiety to aid and instruct, gratitude for aid given, mutual affection; and, these existing, no one of them would think of inquiring whether such a dirty act as that mentioned be "legal" or not.

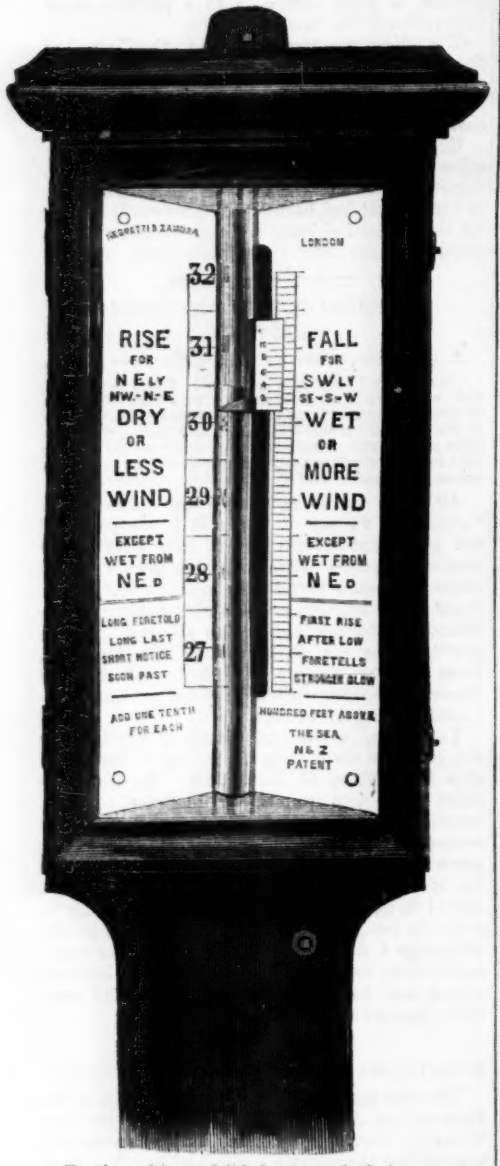
Years ago, in the early travel of boy-days, we enjoyed for a short time the society of the venerable Dr. Möller, of Darmstadt. In his office there were two pupils, or disciples as they would have been called in earlier days. The earnestness with which one of them said, in the course of a conversation as to his master, "If Dr. Möller were to tell me to polish his boots, I should do it, satisfied he was right in asking it, and only too glad to show my thankfulness for the advantage I derive simply from being near him," recurs to us as illustrating a relationship between master and pupil one would desire to find more often than we do.

BIRMINGHAM ARCHITECTURAL SOCIETY.

The first meeting for the present session of the Birmingham Architectural Society was held on Thursday evening, the 4th. It was announced that during the recess a correspondence had been carried on with the Royal Institute of British Architects, relative to the establishment of a voluntary professional examination; a scheme having been proposed by the council of the Institute which, in all its main features, met with the thorough approval of the Birmingham Society.—The following gentlemen were put in nomination as honorary members of the society: Sir Francis E. Scott, Bart., Mr. J. T. Bunce, Mr. S. Timmins, Mr. A. Davidson. The president of the society, Mr. J. G. Bland, then proceeded, after a few prefatory remarks, to read a paper "On the Disposition and Construction of Farm Buildings." Mr. Bland sketched the rise and progress of that class of improved farm buildings which is now becoming every day more and more common. He pointed out the great necessity for economising labour as much as possible, and showed that by judicious arrangements with regard to the position of buildings, a great portion of labour that is ordinarily wasted might easily be saved. The questions of site, of aspect, of the concentration of the buildings, of the uses of water and steam-power, and a variety of other topics, were successively brought forward. After the conclusion of the paper, a conversation followed, and various matters of detail were debated by the members.

Herbert Ingram's Parliamentary Successor.—We last week gave a review of the life of the late Member for Boston, and are led to add to it, that he seems likely to be succeeded by another self-made man, connected with those trades, undertakings, and works, in which our readers are more particularly interested,—Mr. S. C. Ridley (a native of the town), who has just returned from America, where he has been many years engaged in the construction of railways, docks, and public works. In his address to the Electors he declares himself to be in favour of various improvements calculated to benefit Boston; and having a large fortune to spend, he will not be stopped for lack of means. There is a want of such men in the House of Commons.

THE LIFE-BOAT STATION BAROMETERS.


NEGRETTI & ZAMBRA
LONDON
32
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RISE FOR N E Ly NW.-N.-E DRY OR LESS WIND
EXCEPT WET FROM N E D
LONG FORETOLD LONG LAST SHORT NOTICE SOON PAST
ADD ONE TENTH FOR EACH
FALL FOR S W Ly SE.-S.-W WET OR MORE WIND
EXCEPT WET FROM N E D
FIRST RISE AFTER LOW FORETELLS STRONGER BLOW
HUNDRED FEET ABOVE THE SEA
N & Z PATENT

To the subject of life-boats and their arrangements, and the importance of the barometer, we have ere now given attention; and we are glad to learn that the life-boat stations on our coasts will soon be supplied, as some forty of them already are, with barometers such as that in our engraving.

A good barometer will not unfrequently indicate a coming storm two or three days before it actually takes place or reaches the locality where it has been indicated. If such barometers were placed in every harbour, with instructions given to capable residents appointed as storm-warners, an immense saving of life and property would speedily be the consequence. Practical instructions, just such as are wanted, have been drawn up by a nautical man of experience and intelligence, namely, Rear-admiral Fitzroy, F.R.S., and it was he who, as chief of the Meteorological Department of the Government, obtained, some time since, the sanction of the Board of Trade to supply about forty of our poorer fishing villages with barometers, some of which have already proved their value by the services they have rendered. The subject has now been taken up by the National Life Boat Institution, of which the Admiral is a committee-man, and who propose to fix such instruments as the engraving represents wherever useful and practicable at the Society's stations, and in charge of their permanent coxswains as storm-warners. The manufacturers of the instruments will probably be Messrs. Negretti & Zambra, who supplied the forty already fixed, and the cost will be under 6*l.* each. A gentleman has already subscribed 50*l.*, and it is anticipated that the public will readily make up what more may be requisite.

Some curious and interesting information on "signs of weather" are given in the admiral's "Instructions."

"Whether clear or cloudy, a rosy sky at sunset presages fine weather; a red sky in the morning bad weather or much wind, perhaps rain; a gray sky in the morning, fine weather; a high dawn, wind; a low dawn, fair weather.*

Light, delicate, quiet tints or colours, with soft, undefined forms of clouds, indicate or accompany fine weather; but gaudy or unusual hues, with hard definitely-outlined clouds, foretell rain, and probably strong wind.

Remarkable clearness of atmosphere near the horizon; distant objects, such as hills, unusually visible; or raised (by refraction), and what is called "a good *hearing* day," may be mentioned among signs of wind, if not wet, to be expected.

More than usual twinkling of the stars, indistinctness or apparent multiplication of the moon's horns, halos, 'wind dogs' (fragments or pieces of rainbows, sometimes called 'wind galls'), seen on detached clouds, and the rainbow, are more or less significant of increasing wind, if not approaching rain, with or without wind."*

Whether we are indebted to the Admiral for the rhythmical form in which the following "wise saws" are put we know not; but the form is at all events a useful one, and well adapted for record in the sailor's brain, among his longer and tougher but less valuable rope-yarns and other odds and ends:—

"When the wind shifts against the sun,
Trust it not, for back it will run.

First rise after very low
Indicates a stronger blow.

Long foretold, long last;
Short notice, soon past."

Perhaps this is the first "poetry," as well as one of the first specimens of weather-wisdom, ever issued on the authority of an official member of a grave Government department. The lines remind us, by the way, of a very old rythmical weather axiom prevalent in Scotland, and which is in perfect accordance with the Admiral's first prose axiom:—

"The ev'nin red and the mornin grey,
That's the sign o' a bonnie day."

* A high dawn is the break of day seen above clouds, instead of the horizon.

BREAKWATERS AND HARBOURS.

A SELECT COMMITTEE was appointed by the House of Lords to inquire how far it may be practicable to afford better shelter to shipping upon our coasts than is at present afforded, by the adoption of some plan for the construction of breakwaters and harbours less costly and better adapted for certain localities than the system of solid masonry hitherto in use. This committee has just published a report, of which the following is the principal point:—

"The committee feel the importance of seeking every means by which harbours and breakwaters of a less costly construction than those at present in course of formation could be placed on various parts of the coast.

They have taken much evidence on this subject, and have had their attention especially called to floating breakwaters, of which several plans have been submitted to them. Upon the advantages to be derived from these constructions the evidence is conflicting.

The committee are not prepared to recommend that the Government should undertake the task of constructing breakwaters on these principles; but, looking to the vast cost of harbours constructed upon the systems hitherto in use, they are of opinion that a moderate sum may be advantageously expended by Government in testing any plans which may offer a probability of important results in great future saving of money, and in giving protection to life and property in various localities.

To carry this object into effect, the committee recommend that a sum, not exceeding 10,000*l.*, be placed at the disposal of the Admiralty."

LIVERPOOL ARCHITECTURAL SOCIETY.

THE BANKRUPTCY CASE.

THE first meeting of the thirteenth session of this society was held on Wednesday evening, the 3rd, at the Royal Institution. Mr. James Hay, the president, occupied the chair. The president presented to Mr. Raphael C. Isaac a copy of "Brandon's Parish Churches," the prize offered by the society, for the best design for a villa, during the session of 1859-60.

The president announced that a special meeting of the society had been held that day upon professional matters, and called upon the secretary to read the report of that meeting, which was as follows:—"At a meeting of the professional members of the Architectural Society, held for the purpose of receiving an explanation from two members of the society in reference to certain paragraphs which have appeared in the press reports of a bankruptcy case,—It was resolved, 'That, as these members have volunteered a full and detailed statement of the transaction, the meeting desire to record their deliberate opinion;—1st. That it is very much to be regretted that these gentlemen should have been betrayed by any provocation into the adoption of a proceeding so extremely irregular and open to abuse;—2nd. That from the evidence there is no foundation for the imputation of any fraud on the part of these gentlemen;—3rd. That the sum obtained is a very inadequate remuneration for the services rendered in the preparation of the drawings and specifications referred to.'"

The president drew attention to a report of the sub-committee of the five literary and scientific societies of Liverpool, appointed to take into consideration the offer of Mr. William Brown to set apart a portion of the new Free Public Library for the purpose of exhibiting scientific and mechanical appliances. The committee reported that the result of their labours would be the realisation of Mr. Brown's wishes, and that a valuable addition would be made to the scientific institutions of the town, not contemplated when the library was commenced. Mr. Huggins exhibited and explained a chart of the various styles of architecture in the form of a stream, with various branches and ramifications, showing the way in which the styles flow out one from the other. The president then read his inaugural address, which was warmly applauded; and Mr. J. Audsley read the paper of the evening, "History of the Art of Illumination, and its Revival and Application in the Nineteenth Century."

* Fuller particulars are given in the journal of the Association, *The Life-boat*.

A BIG PIPE.

A NEW iron main of great size is being formed near New York, for the Croton Water-works. The sheets prepared for this pipe are 6 feet wide by 8 feet long, and half an inch thick. The iron used is required to stand a strain of 40,000 lbs. per square inch. The pipe is 1,350 feet long, and 7½ feet in diameter. It will be made in sections of 12 feet, requiring 675 sheets, each of which contains 48 square feet, and weighs 960 lbs., or 20 lbs. to the square foot.

Each sheet is punched near the edges with 200 holes. The sheets are then put under a drilling-machine, and each hole is countersunk so that the rivets may be driven flush, leaving the pipe perfectly smooth on the inside. Next the sheets are sent to the rolling-machine, and rolled to the required curve or radius, three sheets butted together forming the pipe. In each 12 feet section there are just 1,200 rivets. The weight of the plates is 648,000 lbs.; of the straps, 145,125 lbs.; of the rivets 50,000 lbs.—making in all a total of about 840,000 lbs. The contract of Abbot & Son, for furnishing the plates and straps, was for 28,859 dols. 81 c. Sneden & Rowland do the remainder of the work, and supply the other materials, for 29 dols. 31 c. per linear foot, amounting to 49,260 dols. 50 c. Total, 78,120 dols. 31 c.

The pipe will rest on about 170 cast-iron standards, or saddles, which are placed 8 feet apart, and weigh about 1,000 lbs. each. It will be protected inwardly and outwardly by coatings of Prince's metallic paint.

The estimated difference in the length of the pipe in summer and winter is 4 inches; and to provide for this expansion and contraction there will be a slip joint at either end, which will be made of cast-iron, with slipping surfaces lined with brass, to prevent their becoming fixed by oxydation. The pipe is mounted on rollers. In regard to the strength of this pipe, it is said that, if supported at its extremities, with 1,350 feet intervening between the supports, it will sustain itself when filled with water.

METROPOLITAN BOARD OF WORKS.

THE PROGRESS OF THE MAIN DRAINAGE WORKS.

AT the usual meeting of the Metropolitan Board of Works, held on the 5th instant, Mr. J. Thwaites in the chair, Mr. Bazalgette presented the following report of the progress and cost of works executed on the several lines constructing for main drainage purposes:—

"I beg to report that the progress of main drainage works during the past summer has not been so satisfactory as could have been wished, owing mainly to the unusually wet season we have had, and other unforeseen difficulties which have occurred.

On the North Side of the Thames.—The Northern High Level Sewer would, with ordinary fine weather, have been completed ere this, but the old Hackney-brook remains to be filled in, and several branch connections and divisions of local drainage will have to be made under this contract. The value of the work executed up to the present time is about 159,700*l.*

The Middle Level Sewer Works have also been delayed by some difficulties with the contractor; it is hoped these will now be satisfactorily settled, and that the works will proceed more rapidly. About 1,100 feet of sewer, 9 feet 6 inches in diameter, has been constructed at Old Ford, and about 2,000 at Paddington. The value of the work executed under the contract is about 10,400*l.*

The Ranelagh storm overflow across Hyde-park is being well executed, about 600 feet of sewer, 8 feet 6 inches in diameter, having been completed, and works to the amount of about 2,200*l.* executed, besides 650*l.* for the underpinning of the Ranelagh Sewer in connection with these works.

On the South Side of the Thames.—The Southern High Level Sewer Works were delayed considerably by the inability of the former contractors to proceed with them, but they are now being more satisfactorily performed by their successors, and about 960 feet of double sewer, from about 10 feet 6 inches in diameter, have been constructed at Deptford, about 1,630 feet of 10-feet sewer at Brixton,

and about 2,000 feet of smaller sewers, besides 3,800 feet of the Effra branch, 8 feet 3 inches in diameter, and another 900 feet, 7 feet in diameter. The works executed under this contract are valued at about 38,000*l.*

"Southern Low Level Sewer.—The portion of this work under the Surrey Consumers' Gas yard, recently let, has not been commenced, owing, first, to some delay in getting the late contractor's plant off the ground, and then to the necessity of sinking further cylinders for the pumping-engines, and the time required to provide suitable engines prior to the commencement of this work. The contract with Mr. Aird for the completion of the work done is still in the course of settlement. The Deptford pumping engines are rapidly progressing, and will be ready for delivery before the engine-house foundations are ready for their reception."

The report was received, and ordered to be printed and circulated.

THE THAMES' EMBANKMENT.

Mr. Le Breton rose to move the resolution of which he had given notice:—

"That it be referred to the Main Drainage Committee to consider and report as to what measures it is expedient to take as to the proposal of carrying out the Thames Embankment in connection with the Northern Low-level Sewer; the throwing open, toll-free, of Waterloo and Southwark bridges; and the making of a viaduct across the Holborn valley, with power to confer with the Government and other parties as to the provision of the necessary funds for all or such of the above works as the Board may resolve upon undertaking."

But, adopting Mr. Deputy Harrison's suggestion, he altered his resolution as follows:—

"That it be referred to the Main Drainage Committee to consider and report as to what measures it is expedient to take as to the recommendations in the report of the Committee of the House of Commons on the Thames Embankment and other improvements connected therewith, and to report to the Board."

The resolution was put and carried unanimously.

ELECTRO-TELEGRAPHIC PROGRESS.

The contracts for laying down the wires (under Allen's new patent) of the United Kingdom Electric Telegraph Company, to Manchester, Liverpool, and Birmingham, have been signed. It is stated that the works will be completed and messages transmitted by Christmas. It is estimated that the entire cost of completing the line (including all necessary offices for 32 stations, instruments, &c.), from London to Liverpool, will be 35,000*l.* The annual expenditure is estimated at 13,500*l.*, and the returns at 41,184*l.*, leaving a profit of upwards of 27,000*l.*, or about 80 per cent. on the capital!

News has arrived of the laying of four submarine cables in the Mediterranean, by Sir Charles Bright, between Valencia and the islands of Ivica, Majorca, and Minorca, and thence to Barcelona.

The Asiatic telegraph has now been carried down to Jezirah, on the Tigris, a hundred miles north of Mosul; and it is expected that, by the end of this month, messages will be transmissible from Constantinople to Nineveh.

New kinds of deep sea telegraphs are now the order of the day; but we are still of opinion that all such schemes should have been preceded by a formal and authoritative investigation, which has not yet taken place.

One of these new telegraphic cables is thus spoken of:—The Algiers and Toulon cable, says the *Birmingham Journal*, is made on an entirely new principle, being composed of hemp and steel wire, and is the invention and the patent of Messrs. John & E. Wright, of the Universe Works, in this town. The wire used is manufactured by the new process of which the firm of Webster & Horsefall are the patentees. Some idea of the extraordinary lightness of this cable may be gathered from the fact that it weighs a ton to the mile. The cable is laid down at the expense of the French Government.

Another new cable, said to be suitable for the Atlantic, is thus described by another contemporary:—"We have had the opportunity of examining the entire details and process of manufacture, from the covering of the copper wire to the completion of the cable, upon a system introduced by Messrs. Hall & Wells. The copper wire is first covered with cotton, over which are wound two or more spiral layers of pure India-rubber, each spiral running in the reverse direction, the whole being covered with a cord of well-tarred hemp: this forms the core, which in turn is protected by longitudinal strands of hemp and wire, kept in position by a closely-plaited hempen covering. The specific gravity of the finished cable is little greater than that of water [and may it not be too light for safe laying? One extreme may be as bad as the other: the safe mean is just one of those important points which still require to be investigated], and the tensile strength is considerably above that of an ordinary electric cable of equal bulk. The machinery by which the core-covering is made, we should mention, is simply the application, on an enlarged scale, of the ordinary plaiting machine, with the addition of a series of independent hollow tubes for laying the longitudinal strands, so that the practicability of manufacturing any length cannot be questioned."

GAS.

Under the operation of the Metropolitan Gas Act, the directors of the South Metropolitan Gas Company have reduced the price of gas 4d. per 1,000 feet. The Phœnix Company has reduced the price 3d. per 1,000 feet. It is anticipated that a similar reduction will shortly be made by the Imperial Company.

The Surrey Consumers' Gas Company have declared their usual dividend of 8 per cent. per annum for the half-year last past. The net profit amounted to 6,609*l.* odds, out of which a balance of 1,227*l.* was carried over to the account of unappropriated profits after payment of the 8 per cent.

The Manchester gas committee report that the sale of gas continues steadily to increase, the rental for the past year having amounted to 154,658*l.* 4s. 2d., being an increase of 9,403*l.* 6s. 2d. upon the rental of the previous year, notwithstanding the reduced price which, during the last six months, has been charged to private consumers within the city. The gross profit amounts to 64,779*l.* 14s. 10d. as against 58,789*l.* 13s. 4d. the previous year; leaving,—after deducting for interest, 16,255*l.* 12s. 4d., and on Sinking Fund account 13,306*l.* 5s. 6d.,—a surplus of 35,217*l.* 17s., divisible between the improvement and waterworks departments. From the pressure, apparently, made by the Local Gas Consumers Association, who are bent on having their gas at 3s. 9d., and object to city improvements out of gas profits, the gas committee and the council have resolved on further reductions in price according to quantity consumed, the lowest to be 3s. 8d. for 1,500,000 feet and upwards per quarterly consumption, and the highest 4s. for quantities under 200,000 cubic feet. Beyond the city the prices are to range from 4s. 2d. to 4s. 6d.

The Sheffield gas company directors report their dividend for the half-year to be the maximum of 10 per cent. on old, and 8 per cent. on new stock, leaving a surplus of 2,269*l.*, which will raise the reserve fund to its conditional maximum, being now 6,903*l.*; so that the directors contemplate a further reduction in price. They therefore propose at once to reduce the charge for their gas to 3s. 9d. to the general consumer, and they anticipate a greatly increased consumption when they shall have reduced it to 3s. 6d.

About eighteen months ago a company was formed for lighting St. Petersburg with gas. The works have now been successfully started: upwards of fifty miles of main pipes are laid, the greater portion being the larger sizes, from 12 to 36 inches diameter.

PROPOSED UTILIZATION OF SEWAGE.

Croydon.—A prospectus of the Croydon Sewage Irrigation Company (Limited) has been issued. This company proposes to apply the sewage of Croydon to irrigate the land contiguous to that town, on a plan devised by the company's engineer, which is said to have received the approbation of high agricultural authorities. It is mentioned that by the plan proposed the sewage manure can be supplied over a large area to estates and farms, at a rate remunerative to all parties. It is to be pumped into a reservoir situated on an elevation about two miles from the town, whence it is to flow to each farm and field by gravitation. The company has obtained privileges for a term of 100 years. The capital is fixed at 30,000*l.*, in shares of 10*l.* each, with a deposit of 2*l.* 10s.

Birmingham.—The residents along the banks of the River Tame, says the local *Gazette*, "have frequently complained that the sewage of this town has polluted their river, killed the fish, and half-poisoned the people. In some instances, legal proceedings have been taken against the corporation, and no slight degree of anxiety or small amount of expense has resulted. The works carried on for some time past at the outlets of the sewers have, we believe, done a great deal towards removing the former causes of complaint; and it is now in contemplation to go a step further, and ascertain whether the sewage matter, having ceased to be a nuisance to the neighbouring farmers, cannot be converted into a positive benefit to them, and at the same time be made a source of revenue to the town. The subject will receive ample discussion; and we believe it will not be the fault of the mayor and corporation if some plan cannot be devised to carry into effect an object in every way so greatly to be desired." A meeting with this view has already been held. It was convened as a conference, by Mr. Lloyd (the mayor), and attended by a number of landowners, farmers, and others. The meeting has appointed a committee to consider the best method of bringing the corporation and the farmers into close contact in this matter.

PROVINCIAL NEWS.

Belper.—The waterworks directors have accepted the following tenders, viz., the Butterley Company's for the supply of cast-iron pipes, &c., and the tender of Messrs. Tomlinson & Harper, of Derby, for the construction of the reservoirs and pipe laying. Operations will be commenced forthwith, to ensure the works being ready by the spring of next year. The plans were furnished by Mr. R. Bayliss, of Derby.

Newcastle-upon-Tyne.—The new Mechanics' Institute and Baths and Wash-houses at Low Walker, built by Mr. Charles Mitchell, of the firm of C. Mitchell & Co., for the workpeople of his firm and the inhabitants of that village, have been inaugurated. The building is situate in the principal street of the village. Mr. Mitchell acted as his own architect. There are apartments on the ground-floor for the keeper of the institute. Above these are the reading-room and library, 52 feet in length and 27 feet in breadth.

STAINED GLASS.

Amongst those glass-painters who are at any rate trying to raise the character of their productions, by the employment, amongst other means, of able artists when terms or opportunity permit it, we may name Messrs. Lavers & Barraud. This firm have recently produced a small light, after a cartoon by Mr. E. B. Jones, artist, of the school known as "P. R.," which deserves mention. The subject is the Annunciation. The Virgin is kneeling amidst flowers, holding in her hand the dove. Gabriel,—

> ——"The angel who came down to earth
> With tidings of the peace so many years
> Wept for in vain, that op'd the heavenly gates
> From their long interdict,"—

stands behind. The Annunciation places before us, as Mrs. Jameson says, "the two most graceful forms which the hand of man was ever called on to delineate,—the winged spirit fresh from Paradise; the woman not less pure, and even more highly blessed—the chosen vessel of redemption, and the personification of all female loveliness, all female excellence, all wisdom, and all purity." It is small blame to say that the cartoon falls short of this; but Mr. Jones has given the Virgin a singularly sweet and touching face. This has been transferred to some extent to the glass; and the whole, although confused and wanting in white light, presents an agreeable mosaic of colours, and a pleasing sentiment for those who rightly look for something more than sparkle.

St. Thomas's, Oxford.—A new window of some importance has just been placed in this church at the east end of the new aisle. The subject is intended to be an embodiment of the idea of Christian worship as seen by St. John in his Apocalyptic vision. The centre of the three lights contains a figure of the Lamb standing on the heavenly altar, His blood streaming into a chalice. Two angels are represented in the two small lights above as holding candles. Below is seen a Priest celebrating the Holy Communion at an altar in correspondence with the altar in Heaven. In the two side lights are angels "harping with their harps," and saints, with palms in their hands, casting their crowns before the throne. The lowest of these alone appear to be historical figures—most conspicuously those who may be supposed to be connected with the locality—St. Thomas the Martyr, St. Frideswide, and St. Margaret, and with them others well known in the history of the English church. On each side is the tree bearing "twelve manner of fruits." The window, based on a suggestion by Mr. Street, is the work of Messrs. Clayton & Bell, of London.

Axminster.—An east window has just been placed in the church of Axminster. The character of it is said to be in keeping with the style of the sacrarium, which is Early Decorated—about A.D. 1315. The ground is a diaper of blue and crimson, bearing medallions, representing in their ecclesiastical order the Circumcision, the Epiphany, the Baptism, the Agony, the Crucifixion, the Entombment, the Resurrection, and the Ascension. In the highest

quatrefoil is "The Descent of the Holy Ghost." The works were executed by Messrs. Powell, of Whitefriars.

Liverpool.—A stained-glass window has just been completed and placed over the sacristy door of St. Agustine's (R. C.) Church, Liverpool. It consists of three lights in the centre, one the figure of Christ as the Good Shepherd, having a lamb in his arms, and in the side lights figures of St. Charles Borromeo and St. Francis de Sales. These figures are placed under canopies formed of cusped equilateral arches, ornamented with the ball flower, and springing from the foliated caps of slender banded columns, of a character united to the geometrical style of the window. The spaces above the canopies are filled with ornamentation composed of the vine, &c., upon the alternate ruby and blue grounds, and surrounded by borders of the strawberry and lily. The spaces underneath the figures, and the openings in the geometrical head of the window, are filled with foliated tracery. The window has been executed by the St. Helen's Crown Glass Company.

Halifax.—The two windows in the north wall of the Rokeby chapel, at the parish church of Halifax, have been filled with stained glass. Mr. Warrington was the artist. Each of the windows consists of three lights, with Perpendicular tracery in the heading. By elevating the centre subject, a pyramidal arrangement has been effected. The window nearest the east is devoted to the life of Abraham. In the centre light the Father of the Faithful is depicted in the act of offering up his son Isaac on Mount Moriah. In the sinister light is the Blessing of Abraham by Melchisedek, king of Salem. The dexter light presents the Meeting of Abraham's Servant with Rebekah at the Well, near the city of Nahor. The other window is devoted to incidents in the life of Moses, viz. the Offerings of the People towards the making of the Tabernacle, the Uplifting of the Brazen Serpent, and the Anointing of Aaron. The Uplifting of the Brazen Serpent occupies the centre light. The head-lights in each window are filled in with angels playing instruments of music; as in the west window of this chapel, which was filled by the same artist about a year ago. For these three additions to the church the parishioners are indebted to the Waterhouse family.

Newcastle-upon-Tyne. — The Ions memorial window, at St. Nicholas' Church, in this town, has been inagurated. It will be remembered that, about this time last year, the local churchwardens determined to place a new east window in the church, with a view of filling it with stained glass to the memory of the late Dr. Ions, the organist of the church. A design for the architectural portion of the work was supplied by Mr. A. M. Dunn, architect, and Mr. Wailes supplied the glass. The window contains seven lights, the stonework of which was executed by Messrs. Patterson & Burstall. The top of the window is enriched by tracery, and the first figure, in stained glass, represents the Lamb and Banner; the two immediately below representing St. George and the Dragon and St. Michael. On either side of these are two large ones of angels, conveying emblems of the passions, surrounded by points of foliage, beneath which are the monograms I. H. S. Further down are double rows of figures, of the sixteen prophets, eight forming a row. To the right and left are figures of cherubim, and the side openings are allotted to the four evangelists. The five central divisions are occupied by incidents connected with the crucifixion of Our Lord. The base of the window is devoted to a representation of the Lord's Supper. The sum raised for the memorial was between 400*l.* and 500*l.*

ROMAN CATHOLIC CHURCH-BUILDING.

Hereford.—The new Church and Monastery of the Benedictines, at Belmont, near Hereford, have been formally opened. The church, the first stone of which was laid six years ago by Mr. Wegg-Prosser, and which has just been consecrated, is cruciform in plan, and comprises chancel, lateral chapels, central tower, transepts, nave, aisles, and south porch. The extreme length is 150 feet by 60 across the transepts. The whole of the interior is worked in Caen, Painswick, and Bath stone. Exteriorly it is built in Sargardine coursed stone, with tracery and dressings in stone from the forest of Dean. The roofs are covered with ornamental Broseley tiles with crestings in metal and earthenware. The ceiling of chancel is sub-divided into compartments by wrought oak principals resting on curved hammer-beams, which are further supported by cusped brackets which rest on angel corbels. The ceilings of the side chapels and transepts are also panelled, but in a manner less elaborate. The clerestory of the chancel is partly formed by gables jutting out of the main roof, forming a line of tracery, terminating in crosses carved in stone. The ceiling of the tower is groined in Caen stone, with carved bosses at the intersection: the same is supported on Devonshire marble columns, which jut out in emblem of the four Evangelists. The east end of the chancel has a window of five lights, which is filled with stained glass, by Messrs. Hardman & Co., of Birmingham. It contains five figures, representing our Saviour surrounded by angels; St. Michael, St. Raphael, and St. Gabriel, with choirs of angels surrounding the archangels. The roof of the nave and aisles are open, and are constructed with arch-principals, strengthened with ring posts and collar beams. The west end is filled with a large rose window, the tracery of which forms a cross composed of roses. The internal decorations are not yet commenced, except the high altar, which is executed in alabus and marble. The church was commenced long anterior to a monastery being thought of, and it is undergoing several alterations. The monastery is entered from the church by a ground cloister, in which recesses are formed for resting. At present only one wing of the monastery is completed: this measures over 200 feet, and contains upwards of 40 cells, with rooms in proportion. The refectory is 60 feet long by 20 feet wide, above which is the library. Of the cloister only one side is at present completed, in local stone, with Bath stone dressing. The whole of the buildings were designed by Mr. Pugin.

Garstang.—The foundation-stone of a new Roman Catholic church has been laid at the village of Scorton, near Garstang. It is intended to be in the Early Decorated period of Gothic architecture. The architects are Messrs. J. Hansom & Son, of Clifton. The church will be seated to accommodate 300, and is expected to be completed in about nine months. The contractor for the joiner's work is Mr. J. Turner, of Preston; and for the masonry, Mr. W. Yates, of this town. The building is to cost about 2,500*l.*

Brighton.—A new Roman Catholic place of worship is about to be erected on a piece of ground now occupied as a timber-yard at the top of Hampton-place, Brighton. "Three tenders were at first sent in," says the local *Gazette*, "one from Messrs. G. Cheesman & Freeman, another from Mr. Fabian, and a third from a firm in London, and there was not 40*l.* difference between any of them. After Messrs. Cheesman & Co. had received a letter stating that theirs was the lowest tender, the next morning they received another letter to the effect that a subsequent tender had been sent in by the evening post, from Messrs. Patching & Son, precisely the same in amount. On Tuesday Messrs. Cheesman & Co. received information that their tender was accepted." The work will be forthwith commenced.

Wexford.—We are requested to state that the two churches at Wexford, described in the *Builder* on 29th September, were designed by the late Mr. R. Pierce, of Wexford, and were erected under his superintendence.

CHURCH-BUILDING NEWS.

Soo-Ruston (*Norfolk*).—The church of Soo-Ruston, situated about five miles from North Walsham, is having the chancel restored at the sole expense of the impropriator. The roof, which is of hammer-beam construction, will be taken off and reframed, and new oak timbers inserted wherever required. The altar railing will be of open oak tracery, and the benching, running east and west, of the same material. New buttresses will be erected at the east end, with panelled stone fronts, and the gable finished with stone coping and cross. The paving will be Staffordshire tiles, laid in irregular devices. The interior of the walls will be stuccoed, and the east end diapered in fresco, with the commandments and texts on zinc, let in flush with the plaster. The works will be carried out, under the superintendence of Mr. R. M. Phipson, by Mr. Mace, of Coltishall. The nave is in a terribly bad state of repair, the roofing covered with thatch in a most dilapidated condition. Plans for this part of the church have also been prepared by Mr. Phipson, and the rector, the Rev. H. White, has offered to guarantee the collection of three-fourths of the sum required for properly restoring it; but the ratepayers, who consist solely of two farmers, have at present declined to accept this very liberal proposal.

Ipswich.—The church of St. Mary-at-Elms, Ipswich, is about to be benched throughout, and new pulpit, reading-desk, and altar railing erected, from designs by Mr. Phipson. The main body of the church, consisting of a nave and north aisle, is a common-place Late structure, but there is a good Norman doorway, with its original ironwork, of elaborate and excellent design, which will be carefully preserved. The tower is red brick, of Tudor date, relieved with black diamond work. The contractor for the works is Mr. Seager, of Ipswich.

Wednesfield.—The chief stone of the mortuary chapel, to be erected in the new parochial cemetery at Wednesfield, has been laid. The intended chapel will be erected opposite to the main entrance, the porch facing the gates. The material employed will be red brick, relieved by three bands of white brick, and white stone copings, window sills, and cross. To the left of the entrance porch there will be a small belfry tower, surmounted by a spire. The internal dimensions will be 35 feet in length by 15 feet 6 inches in breadth. Light will be communicated by two main windows, one at either end, and by six side lights. The entire cost of the building will be about 400*l.* Mr. Edward Banks, architect, supplied the design, and the work will be executed by Mr. Plant, builder, Wolverhampton.

Bradpole (*Dorset*). — St. Andrew's Church, Bradpole, near Bridport, has been opened. The edifice is intended as a Chapel of Ease to the parish church of Bradpole. The church is in the Early Decorated style of architecture. The interior comprises a nave and chancel, with a robing room on the south side, which also serves as an organ chamber. The edifice is capable of receiving more than 300 persons. The length of the nave is 84 feet, and its width 26 feet. The chancel—24 feet long by 18 feet wide—is separated from the nave by a moulded arch. All the seats are open: those in the nave are of stained deal; those in the chancel, of oak, carved. The pulpit and font are of Hambill stone, carved. The east window is of stained glass, representing the Baptism, the Holy Supper, and the Crucifixion. The quatrefoil window, of stained glass, in the gable, represents the Ascension. Nearest the east window, on the north side, is an angel window, intended as a memorial to the father and mother of the vicar of the parish. There are two figures. Another stained glass window, by the side of the one just mentioned, has been raised by the laudable exertions of the organist and choir. On this are figures of the prophets Isaiah, Jeremiah, Ezekiel, and Daniel. The south window in the chancel is erected in memory of a brother of the vicar of the parish: it represents, in a style corresponding with that of the others, St. Peter and St. Andrew. The reveals of each of the side windows are ornamented with wreaths of passion flowers, executed, principally, by Mr. W. K. Brown, of Bridport. The end wall of the chancel is decorated with ornamental foliation, which, with most of the other decorations, are the work of Messrs. Harland and Fisher, of London. A wreath of grapes and corn ears runs along under the wall plate on each side of the chancel. This is the work of Mrs. Broadley (the wife of the vicar). The chancel is paved with ornamental and plain tiles. The five windows on each side of the nave, are respectively surmounted by a text in scroll. The eighteen corbels of the building are adorned with shields, each bearing a sacred emblem, executed by Mrs. Broadley. A border of passion flowers running the whole length of the nave, on each side, under the wall plate, was executed by Miss Gunning, daughter of Archdeacon Gunning. The roof is open, the rafters being filled in with plaster, coloured. The building will be fitted up for gas. The building site was the gift of Mr. Albert Way, one of the landowners of the parish. The architect was Mr. Talbot Bury. Messrs. Chick & Son, of Beaminster, were the builders; and Mr. Gibbs, of Bradpole, the mason.

THE MIRACULOUS CABINET.

Under this title an extraordinary work of art, invented and produced by H. Nadolsky, was exhibited on Wednesday evening last, in the Dudley Gallery, Egyptian Hall. When we say that this cabinet, measuring only 5 feet high, 3 feet wide, and 18 inches deep, contains 150 pieces of furniture, of the same size as in ordinary use, some of our readers will ask for a list; and, as a curiosity, here it is:—A judge's large table, with ornaments, books, and six chairs; four large card-tables, two Chinese tables, a smoking-table, a lady's work-table, two beautiful large Chinese toilet-tables, a large chess-table, four work-boxes, four flower-

pots with flowers, a what-not, a large candelabra, a full-sized bed with hangings, and a baby's swing cot; a round toilet table, an embroidery frame, a large flower-table, five small Chinese lamps, two large ditto, two Chinese toilet candlesticks, twelve fancy boxes, a footstool, a painter's easel, four music-stands, a dining-table with twenty-four covers laid complete; four large dishes, twenty-eight plates, thirty cups, saltcellars, &c.; a large chandelier containing twelve wax lights; nine garden chairs, four parlour candlesticks, a Chinese writing-desk, a fancy inkstand with wax tapers, rulers, and bell; a tea-tray, a drawing-room table, a throne, a throne-chair, four small flower-tables, a large table, inlaid with specimens of shells, glass top, &c., &c. It certainly is a most ingenious work of mechanical skill. When the various articles are put together and spread over the apartment, the notion of putting them all back again into the snug little cabinet seems scarcely less than absurd. We have seen many a good packing-case, but never such a wonderful case of packing.

SANITARY STATE OF ST. GILES'S.

A REPORT by the medical officer of the district, Dr. Buchanan, to the Local Board of Works, has been printed, in which the sanitary state of St. Giles's in 1859 is treated of, together with the means taken for its further improvement. From this report it appears that the unhealthiness of this once notorious district is steadily diminishing.

The district south of Great Queen-street, as about Great Wild-street, is the worst part of St. Giles's; and in this part there has been an increase of mortality, although formerly other portions were more unhealthy. This may probably have in some measure arisen from sanitary attention having naturally been first given to the unhealthiest part of the district, and this would only show more clearly the power of sanitary efforts to save life and improve health. At the old rate of mortality, 292 lives have been saved in St. Giles's during the last two years.

Russell-square must be still a remarkably healthy spot: the mortality there is only 13·6 per 1,000, although 17 per 1,000 has been regarded as the inevitable death-rate of a town population: this axiom, therefore, demands correction.

It is a notable circumstance that the births of females were last year the most numerous in St. Giles's. This is of very rare occurrence anywhere, one should think, although more females live than males, the surplus of the latter, and somewhat more, dying off, till the females exceed the males; but there are generally more males born than females. Last year, in St. Giles's, however, 887 females and 842 males were born: 687 females and 727 males died: 602 children died under five years of age.

The truthfulness of the illustrated delineation of a nuisance in Drury-lane, in shape of a cow-house, given in the *Builder*, is testified by the medical officer, who remarks that an interior view would have proved worse than the exterior one, and adds that some improvements have been effected in this class of unmitigated nuisances.

The reports of the local medical and other officers of health in the metropolitan districts are very valuable, and will be of still greater interest in future years. There ought to be some central repository, in which every one of these reports should be carefully kept, so as to be available to the public when required; otherwise it will soon become difficult to obtain them. Would not the office of the Metropolitan Board of Works be a very proper site for a public sanitary library, in which these records could be stored? The new Society of Officers of Health should see to this.

THE COLOSSAL RIVETTED STATUE OF ST. CHARLES BORROMEO.

IN my professional peregrinations I have recently come across the curious colossal statue of St. Charles Borromeo, placed on a hill near Arona, overlooking the Lago Maggiore.

This statue, which is upwards of 70 feet in height and mounted on a pedestal which rises 30 feet above the top of the hill, was placed in its present position in the year 1624.

The pedestal is of stone, but the statue itself is is entirely formed of plates of bronze and of copper riveted together in patches of every form and description something after the manner, but without the regularity, of the Britannia tubular bridge over the Menai Straits. The work is very strong—stands the war of the elements in its exposed situation in a very remarkable and instructive manner—and is a monumental attestation to the truth of the proverb, that "there is nothing new under the sun."

It is even more wonderful than our wrought metal bridges and boats, inasmuch as its exterior represents in an almost life-like manner all the beauties of sculptured humanity. The expression of the features, the attitude of the body, I might almost say the vigour of the intellect, are here admirably portrayed; and, down to the minutest details, although on so large a scale, the whole is in excellent keeping. The folds of the drapery are exhibited in the most natural manner imaginable. It is altogether a most interesting work of art, executed with great talent, while it is also a curious specimen of engineering and constructive skill. It cost nearly 40,000*l.* in those days when labour was cheap, and money had not the value it has now: probably, in our days, the cost of such an undertaking could not be afforded. It is, therefore, precious on every account.

In French measure, the face is 7 feet 2 inches wide, and 7 feet 6 inches long. The length of the nose is 2 feet 7 inches. The eyes are 1 foot 6 inches long: the mouth is 2 feet 4 inches. The length of the arm is 28 feet: the length of the thumb is 4 feet; and the circumference of the robe 54 feet.

I went up the statue to examine its structure, but shall not do so again in a hurry; nor would I have done so then merely for the sake of saying I had been inside the nose, and walked about in the head. Had it not been that I wished to make a *personal* inspection of the work, I should have employed a chimneysweeper to examine it for me, and bring me back his report in the event of his getting down safely, as the operation I had to perform was (as far as I can judge, seeing that I never did ascend a chimney), much more akin to the performances of his profession than mine—*mais revenons à nos moutons.*

A ladder, about 40 feet long, borne by some three or four men, was brought up to the top of the hill, and placed against the cornice of the pedestal. This was kept in position by a kind of scaffolding of poles, so as to prevent it swaying in the wind, or oscillating with the weight of my body while performing the climbing operation of raising my feet and hands from one rung to the other, which are about a foot apart.

When I got upon the pedestal, which is very narrow, and altogether too small for the mass of metal placed upon it, a circumstance which gives the whole monument a somewhat top-heavy appearance, I began to examine the plates of metal of which the statue is composed. During this time the men were affixing, by means of iron cramps, another ladder on the top of the first, by which I got up a further height of some 20 feet in addition, and then with no little difficulty had to squeeze myself into a small aperture between a fold in the robes and a *core*, if I may so say, of masonry, which is carried up inside the statue to about the top of its shoulders; and here the climbing becomes difficult or rather strange to such as myself, who have not been occupied very lately in such peculiar gymnastic exercises. This chimney is very wide, and has bars built into the masonry of it on either side: thus it becomes necessary to extend the legs and arms very widely apart, and feel on either side with hands and feet for the frail supports to which, *nolens volens*, after having got so far, it is incumbent to cling. I do not remember having made such a peculiar ascent anywhere before, and it put me in mind of the mountebanks sometimes seen in Italian cities, raising themselves to an altitude between two columns, so as to enjoy an elevated position from whence they may harangue the crowd congregated to witness their saltambics.

Having then, by dint of exercising every muscle in my body, during which time it would not have been wholesome to have been attacked with the least symptom of cramp, seeing that any relaxing of my hold would have precipitated me immediately to the bottom, without meeting anything on the way even to break my fall, I arrived on the top of the masonry, and my head was about on a level with the lower jaw of the figure. No sooner had I arrived, than I was invited to look down on the other side at the book held under the left arm of the statue, which is open at the top, and presented all the appearance of a brewer's vat.

The interior of the head would make a comfortable little sitting-room, as you can well understand when I tell you that it measures some 20 feet round. I looked out from a little chink between the plates, just above the right eye, and which to the less initiated below probably represents the eyebrow. From this the view is magnificent. The tranquil waters of the "Langen-see," as the Germans call it, lay stretched before me, and the blue hills of Lombardy were scattered and piled up capriciously and fantastically beyond the ripple of its waters: then the wide plains of Lombardy lay farther off in the distance, and lured the eye towards the far horizon. The plates are not half an inch thick, and are connected together by an immense number of small-headed copper rivets. The whole mass must have been adapted to some mould before being put up, otherwise it would have been altogether impossible to get the external shape so accurately.

The eyes are evidently cast, as the pupils are well defined, inside as well as out. The ears stand out remarkably, as the figure is represented with very short hair. All the details are well managed, and even two or three days' growth of beard upon the chin is cleverly imitated, and, from the great size of the figure, may be remarked even from the foot of the pedestal below. Sculptors and artists who visit Italy should not fail to see it, while engineers, if they could not take a leaf out of its big book, may find plenty to learn from it, and perhaps something to copy.

WILLIAM H. VILLIERS SANKEY.

THE FUTURE FOR ARCHITECTS.

LONDON AND PARIS.

IN his annual notification that the architectural courses at the University College, London, will commence on Tuesday, the 23rd instant (of which, by the way, we hope many will avail themselves), Professor Donaldson makes the following observations, which may be usefully made permanent in our pages:—

"In the *Moniteur*, of the 25th August last, there appeared a very striking review of the works executed at Paris by the Emperor Louis Napoleon, since his accession to the throne of France in 1852. This enumeration embraces the operations of the Imperial Government and of the Municipality of Paris: it records lines of streets and boulevarts pierced through the centre of the city, the doubling of its superficial area by the addition of a suburban zone; the completion of the stupendous palace of the Louvre; the erection of churches, schools, district courts of justice, six barracks, market-places, fountains, theatres, squares, hospitals, eight bridges, making twenty-two which span the Seine; while we have at most eight for all London, with its immense population and colossal commerce. Whole quarters of Paris have been pulled down to produce direct thoroughfares from east to west from north to south, and to afford access to the centres of commerce, improving also the public health,—the results of a determined concentrated will for the public good.

This presents a humiliating picture to us when we compare this statement with the torpid operations of our Government and our Municipal Corporation, even although we call to mind that many of the works above enumerated are in this country carried out by individual or associated private enterprise. Our Administration requires offices for the Indian Department, and takes refuge in part of an hotel, built as a speculation by a company. And so insuperable appear to be the obstructions and difficulties which attend the realization of our public works, however imperative, that the absolute need of War and Foreign Offices, for the due administration of the business connected with those departments, urgent as it may be, is made to yield to personal interests and to a battle of parties and styles; and years may intervene before the want is supplied. Even our City Corporation, important as the works have been which they have carried out, can, with unaccountable shortsightedness, cover with a huge warehouse a vacant plot which afforded the finest view of our metropolitan cathedral and facilitated direct communication with various parts of the City where most required.

Still London, although far behind in the Governmental activity to promote improvements and to direct, as in Paris, the public taste for monumental splendour and magnificence, has advanced, through private enterprise, in the style of its commercial and domestic buildings more than any other metropolis. We see clubs, banks, insurance offices, and like institutions, offer erections honourable to the present school of art, and evidencing great progress in professional skill and taste.

There is a noble future for the rising generation of architects. The development of the British empire has been incalculable: the population has doubled within a short period: its commerce knows no limit. England, and even London, of 1860, compared with England or London of 1800, are as giants to pigmies. A like extension of Government establishments, to insure a ready and economic administration of the public business, must take place; and necessity will *compel* our Government to satisfy these requirements, which foreign administrations would seize with eagerness, to adorn a sovereign's reign or reflect honour on a ministry that would undertake them. Our Ministers and Parliament cannot continue to hesitate, when our great commercial cities and provincial towns show what energy and taste for architecture may effect.

It is then for the young architects and builders to fit themselves for coming opportunities. The war of styles may still continue: our usages and tastes may become modified. There will be required fresh combinations and appliances. Science must progress as well as Art; and construction must advance with like energy. There is a wide field open, and who shall be equal to the struggle for the occasion, for reputation, for success? Those only who acquire beforehand the elements of sound professional knowledge,—who make themselves acquainted with the finest productions of the ablest and most refined minds of past ages,—who devote a zealous earnestness to the study of the subject,—who are determined to excel and to rank among the great architects and builders who have endowed their country with noble works, and to take place with our Inigo Jones, our Wren and his master-mason Strong, our Vanbrugh, our Chambers, of the past; with our Barry and Cubitt of recent times."

STEPNEY UNION COMPETITION.

Sir,—I truly hope, for the honour of the profession, that not a single architect will apply for the "particulars" relative to the above competition. I fear, however, that the usual "numerous applications" will be made. If so, it would be very desirable, if practicable, to obtain the names of such applicants, and publish them. We should then discover *some* of the "*black sheep*."

I have long entertained the opinion that the present disgraceful system is fostered by those architects who enter indiscriminately into *all* competitions (as a wheel of fortune from which a prize may possibly be drawn), without considering the respect due to themselves or the profession of which they are members.

N. E. Stevens.

LEICESTER CHAPEL COMPETITION.

Sir,—As one of the competitors for the Leicester New Connection Methodist Chapel, I ask for the admittance of this protest in your journal. As the result was made known through the *Builder*, I think the injustice of the committee should also be made known through the same medium. I was informed that on no account would the stipulated sum of 1,600*l.* be allowed to be increased by the architect. It turns out, however, that the successful competitor had ornamented his design so as to considerably exceed the stipulated sum,—to the amount of six or seven hundred pounds more. Of course this amount enabled the architect to please the eyes of the committee far better than would a design which was limited to the stipulated sum. This is a piece of great injustice to the other competitors.

One of the Competitors.

*** The tenders will be found in our present number.

ST. PATRICK'S CATHEDRAL, DUBLIN.

Sir,—If any justification of the statements in my letter of the 22nd of September were needed, such has been amply supplied by the writer of the paragraph in *Saunders's News-Letter* of September 29th.

I have to congratulate the authorities on the champion they have obtained, who has made the startling disclosure that for the last sixteen years they have wilfully and deliberately closed their eyes whilst the cathedral was undergoing a gradual process of "debasement." The bad taste of the writer will be best shown by mentioning that these so-called "debased" works were executed after the design, and, for the most part, under the immediate superintendence, of the late Mr. Carpenter. His ignorance may be guessed from his own admission, that he does not know what is meant by an "Early English wall," or how "a wall" could be designated as belonging to any "order." (?)

In point of fact, there are only two statements to which a denial has been given. As to the first, I have only to say, in reply to the writer's assertion that every care was taken to have an accurate restoration of the nave, that I have reason to believe that such accuracy has not been secured. As regards his denial that there has been any exclusion from viewing the works, I need not say that I did not make the assertion without having what I believed to be good authority for it; but I am glad to learn that I was mistaken; and I shall be happy to avail myself from time to time of the proffered permission to see the progress of the works.

The parties engaged in the present restoration cannot consistently claim immunity from criticism, seeing that they have themselves alluded to the unfortunate misapplication of the munificent sums placed at the disposal of the dean and chapter of Armagh by his Grace the Lord Primate, for the restoration of that cathedral.

Mediævalist.

THE "BUILDER'S" LAW NOTES.

Leases: Written Memorandum.—A person agreed in writing to take the lease of a house for the residue of the lessor's term (being five years), and also to take a lease of stables "at the same rent and on the same conditions as the lessor held them by." This was for an unexpired term of seven years; but, as the term for which the stables were held was not specified with certainty in the writing, it has been held that there was not a sufficient written memorandum to satisfy the law as laid down in the "Statute of Frauds."—*Fitzmaurice* v. *Bayley*.

Railway Company: Compensation to Landholders.—A landholder agreed to submit to arbitration his claims against a railway company for compensation for injury done to his land, and for the loss of the land taken by the company. He died before the final award was made; and when, after some enlargement of the time for the award, it was at length made, several objections were taken by the company. The whole case came, on appeal, before the House of Lords, and the following important points were decided. It was held that the submission to arbitration did not expire with the death of the landowner; that the time for making the award may be enlarged for the purpose of suiting the convenience of the parties, because the sections in the Lands Clauses Act, providing for the award in three months, was introduced for the benefit of the parties; that an arbitrator may employ any experienced person or scientific man to assist him; that he may award damages for injuries likely to occur; that he may include damages likely to be caused to the tenants of the landowner; and that under the Lands Clauses Act the right to compensation exists if the railway cause the injury, even though the lands affected may be distant from the line.—*Caledonian Railway Company* v. *Lockhart*.

Charitable Legacy: the word "Poor."—A lady left by her will certain sums of money to "twenty aged widows and spinsters," in a certain parish. As age did not necessarily imply poverty, it was argued that the legacy could not be supported as a charity, and it would thus lapse for uncertainty. It was decided, however, that, as the object was clearly charitable, the legacy was good, and it was ordered that the word "poor" should be added.—*Thompson* v. *Corby*.

Railway Company: Repair of Highway.—A railway company in Ireland carried its line over a bridge which spanned the highway; and, in order to afford head-room for traffic, the company lowered the highway and placed it in a substantial condition. The lowered part of the road afterwards became out of repair. The local justices ordered the company to repair the same; but this order was reversed on appeal to the Queen's Bench by the judgment of two judges out of three.—*The Waterford and Limerick Railway* v. *Kearney*.

PATENTS IN CONNECTION WITH BUILDING.*

Compression of Bricks, Tiles, &c.—*L. J. Brethon*, Tours, France. Dated 2nd February, 1860.—This invention cannot be described without reference to the drawings.

Brickmaking Machine.—*G. Cowdery*, Strood, Kent. Dated 16th February, 1860.—The patentee claims the use of a triangular feeding shaft and endless band or chain of moulds or clay-holders, together with the movable projections on the centre rollers, in combination with the stampers or plungers described.

Bricks.—*T. H. Morrell*, Leyland, Lancashire. Dated 17th February, 1860.—The patentee claims, firstly, the lining of machine moulds or dies for making solid or perforated bricks with raw untanned skin or hide, as described. Secondly, the use of one cross-bar, with two or more rows of perforators or studs attached thereto, for the moulding of perforated bricks, as described. Thirdly, with reference to the apparatus for pressing perforated bricks, the adaptation or use of two press-plates with panels and cores or studs attached. Fourthly, with reference to the apparatus for drying brick, tiles, and other articles made from plastic earths, the arrangement of racks or frames fixed to the roofs and walls of drying sheds, as described. Fifthly, the general construction and arrangement of hot-air flues or ventilators in combination with a central shaft, sheds, and hot air chamber, as described, and also the use of such or similar flues or ventilators in combination with a chimney-shaft and sheds only for such or similar purposes.

Miscellanea.

Proposed New Law Courts.—The inhabitants of Holywell-street, Strand, and places adjoining, have received the following circular:—"Sir: It having been determined to seek powers from Parliament in the ensuing session to concentrate the law courts and offices on the locality on which your house stands, and I having been authorized to prepare the necessary survey and reference, venture to beg the favour that you will permit the surveyors engaged on the work to have access to your premises to take the necessary plans, and that you will further oblige by affording them all the information in your power relative to ownership.—H. R. Abraham, Surveyor."

The "Continental Diorama" at Egyptian-Hall.—This exhibition consists of a hotch-potch of views which have been exhibited already in London under different titles, some of them more than once. Several of the pictures are very well painted; but, holding it to be dishonest to lure the public to what professes to be a new exhibition, but which many of course discover, after they have paid their money, they have seen before, we have no words for it but those of reproof. Mr. Leicester Buckingham, who supplies the descriptive lecture, can scarcely be aware of the fact.

Patents.—Locks for Doors.—In your impression of 29th September last, p. 630, is an account of a lock "formed to admit the key at opposite sides," &c., for which a patent has been obtained. Probably the inventor is not aware that a lock of the same kind, upwards of 300 years old, exists upon a door in King's College Chapel, Cambridge. The lock was taken off and carefully repaired last year, at an expense of 18*s.* 6*d.*, and is now in good working order.

Cantab.

* Selected from the *Engineer's* lists.

Great Length of Railway Rails.—The Messrs. Barningham, of the Darlington Iron Works, are at present engaged in rolling a large quantity of rails of unusual dimensions. They are 27 feet in length, and their weight is 82 lbs. to the yard.

Cost of Leeds Townhall.—A printed document, produced at the town council the other day, showed that the total cost of the building was 113,239*l.* 19*s.* 7*d.* Mr. Titley said that statement did not include the expenses attending the Queen's visit, nor the cost of the expensive lamps outside the hall, nor was there any allowance for interest. If those three items were taken into consideration, the cost of the building was from 125,000*l.* to 130,000*l.*

Sinking of Magazine, Woolwich.—A spacious flat-roofed magazine, under construction in Woolwich marsh, and now nearly complete, was last week discovered to have suffered from the yielding of the base to such an extent that a considerable portion of the building will, probably, have to be removed and rebuilt. The disaster is attributed to the late rains having carried away some of the subjacent marshy stratum insufficiently prepared with concrete and other heavy substances in forming the foundation.

The Land of Song and Dance.—According to the "*Trovatore*" Italian journal the number of singers of both sexes in Italy amounts at present to 1,730. Among these are enumerated 410 *prime donne*, 330 tenors, 280 baritones, 160 bass singers, 50 comic. Italy produces 1,670 *danseurs* and *danseuses*, viz., 180 of the first rank of the latter class, called *di rango Francese*; 220 first *danseuses, di rango Italiano*; 110 first dancers, 970 of both sexes, *mezzo carattere*, and 40 ballet-masters.

New Invention in Printing.—At Vienna a printing machine has been brought out, dispensing with the use of all other assistance save that of mechanical apparatus. No persons are required to feed it with paper, or to remove the printed sheets, both processes being accomplished through the instrumentality of the machine itself. The paper for this purpose is supplied in rolls many hundred yards in length. The machine first cuts a sheet off the requisite size, then prints, and finally throws it off—a newspaper ready for the reader. All that manual labour is required to do is to bring forward fresh rolls, and to take away the printed sheets.

New Application of Peat.—Some improvements in manufactures from peat have been patented by Mr. H. Hodgson, of Ballyreine and Merlin Park, and Mr. P. M. Crane, of the Irish Peat-works, Athy. The invention consists in preparing from peat, in its natural state, blocks, slabs, or pieces of any size, form, or thickness, which blocks, slabs, or pieces are said, when so prepared, to be useful and economical in the construction of parts of buildings, and for various other useful purposes. They place these blocks between cloths of woven or textile fabric, or other suitable material, and the peat is placed between shelves, and submitted to hydraulic or other pressure. The water is entirely forced out and the peat solidified, and drying is effected either by exposure to the atmosphere or in a room heated artificially, or by any other process. They are then put again between the plates of a hydraulic or other press, and extreme pressure put on them. If the product of their invention be required for use for inside work in building, such as partitions, linings, inside roofing, or for other work, as a non-conducting substance, they do not require other further preparation than shaping, provided they are not to be exposed to wet. But the slabs or pieces used for roofing (instead of slates, tiles, or other things of that nature) they prepare to resist the wet or action of the atmosphere by steeping them in, or saturating or coating them with, some fitting material to resist wet, such, we presume, as pitch.

The Late A. E. Chalon, R.A.—Mr. Alfred E. Chalon, R.A., portrait painter to her Majesty, has just passed away from among us, having died a few days since, at his villa on Campden-hill, Kensington, at the ripe age of fourscore years. He was of Swiss extraction, and brother of the late Mr. John James Chalon, R.A. He drew entirely with the pencil and in water colours, and he attained celebrity as a painter of ladies of rank and fashion, more especially in their court dresses and trains. He continued to exhibit at the Royal Academy down to the last. A few months since he offered to bestow his collection of paintings and sketches upon the parish of Hampstead, on condition that the parishioners should subscribe money sufficient to build a place for them, and pay a small stipend to a curator; but the offer was not accepted.